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CONSUMPTION

AND

THE HYPOPHOSPHITES

By the same Author.

De la CAUSE IMMÉDIATE de la PHTHISIE PULMONAIRE et des MALADIES TUBERCULEUSES, et de leur Traitement spécifique par les Hypophosphites, d'après les principes de la médecine stœchiologique. *Deuxième Édition,* 1 vol. in-8vo. de près de 1000 pages. Paris: Victor Masson et fils. 1864.

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RECUEIL d'OBSERVATIONS, MÉMOIRES, RAPPORTS et DOCUMENTS sur le TRAITEMENT des MALADIES de POITRINE au moyen des HYPOPHOSPHITES. *Quatrième Édition.* Paris: Coccoz. 1873.

On the PREVENTION of CONSUMPTION by the use of the HYPOPHOSPHITES. London. 1859.

Preparing.

On the DISEASES of RESPIRATION (Asthma, Bronchitis, &c.) and their TREATMENT by SPECIFIC INHALANTS, on the principles of Stœchiological Medicine.

CONSUMPTION

AND

TUBERCULOSIS

THEIR PROXIMATE CAUSE AND SPECIFIC TREATMENT BY THE

HYPOPHOSPHITES

UPON THE PRINCIPLES OF STŒCHIOLOGICAL MEDICINE

BY

JOHN FRANCIS CHURCHILL, M.D. PARIS

With an APPENDIX on the LOCAL TREATMENT of RESPIRATORY DISEASES by SPECIFIC STŒCHIOLOGICAL INHALANTS

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PREFACE.

> Nostra ætas incuriosa suorum; et si quid novi ab homine coævo in medio ponitur, risu ut plurimum ineptisque cavillationibus excipiunt: quippe facilius est aspernari quam experiri.—LAENNEC, *De l'Auscultation.*

> Nec timeo, quamvis plures sint, qui in me et mea medicamenta sævere, et subinde sat ruditer invehuntur; etenim hos pacata mente et sicco pede prætereo; viris tantum iis scribo qui artem amant et ejus incrementum, atque recta corda habent et ab invidia (quod turpe vitium maxime inter medicos utinam exularet) penitus sunt immunes.—STÖRCK, *Experimenta circa nova sua Medicamenta.*

MORE THAN ONE HUNDRED THOUSAND persons are now suffering in England from Consumption and the allied diseases of the tubercular type, of whom SIXTY THOUSAND will have died within the year, leaving their places to be filled by an equal number of future victims. Of the whole number of adults doomed to die in the prime of life one third will be cut off by Consumption alone.

If one hundredth part of this number of our fellow beings were destroyed, each year, by some sudden and unforeseen catastrophe, universal pity would be aroused, and the public mind would have no rest till a remedy had been found. But disaster and suffering a hundred times more extensive, and a thousand times more ruinous to the common weal, are acquiesced in with equanimity or indifference because they are supposed to be inevitable.

Yet if facts have any value, arguments any cogency, the almost unvarying scientific testimony of professional experts, any weight, no unprejudiced physician, no one accustomed to the methods of scientific research, no person of average education can, after reading this book, come to any other conclusion than that the greater part, if not the whole of this premature death, of this wasting of the bloom, the promise, the pith, and the vital efficiency of the country, might be stopped within a few months, and might have been so stopped at any time for the last seventeen years. If, as it is said, Englishmen care little for theories, and are impervious to argument, but yield a willing assent to facts, this will be the inevitable inference to which the reader will be led by the record of facts here presented. More than three fourths of these have been collected by independent and widely-separated observers, unknown to one another, many of them eminent in the profession, some very unwilling witnesses, all having no interest in error, all rather understating than overstating the case, and most of them giving only a very few instances as samples of a much larger number.

But while the reader arrives at this conclusion he will also see that this will not be done, that not only the poor, but the rich, the powerful, the promising, will be allowed to sink prematurely into the grave without scarcely a hand being stretched forth to save them.

As the greatest man of his time, Cromwell, was left to die of ague while London was full of its antidote, cinchona bark, which the contemporary physicians could not and would not use, so will the flower of the land be yearly swept off by Consumption while its remedy and preventive, the hypophosphites, are within the reach of all.

Such is the practical result which this work is intended to demonstrate, but in a scientific point of view its aims and pretensions are, if possible, greater still. It will be shown that this discovery of a *scientifically-conditioned specific* of Tuberculosis and Consumption, however unexpected and unhoped-for it might have seemed only a few years ago, is not the result of some lucky accident, but a deduction from a new and general principle which underlies all vital phenomena, and by which our knowledge of remedial powers and agencies, which is the practical and essential part of medicine, will in time be raised from its present state—that of a mass of confused and discordant technicalities—to be a definite and positive science like physics and chemistry. Henceforward, at least, it will be freed from the reproach levelled at it by a popular writer a short time since: 'that it is still in the theological stage, and that not one of its so-called specifics has been discovered deductively, or even been justified *à priori*' (Buckle's 'Posthumous Works,' vol. i. p. 339). Here, in the hypophosphites, we have a specific arrived at *à priori* by hypothetic induction, verified by clinical experiment, and confirmed by a concordance of the widest and most numerous array of facts ever brought forward in pathology.

There is more still. This same theory of stœchiology, which led to the discovery of the *specific remedy* of tuberculosis, has since then produced that of a series of specifics for all the inflammatory diseases to which the whole breathing apparatus is subject—asthma, bronchitis, pneumonia, pleurisy, angina, laryngitis, diphtheria, whooping-cough, croup—all this long array of troublesome, frequently incurable, and always widely fatal diseases, is now as amenable to the means of science as ague is to quinine.

The lives of *nearly one hundred thousand* persons who die each year in England of these complaints might be dependent upon the truth of this assertion. But of this second practical result no proof is vouchsafed: no revelation of the means is made or intended. Not only the dignity, the legitimate influence, and the future advancement of science, but the true interests of humanity, forbid that this new potency for good should be let fall into the mire of ignorant or dishonest misrepresentation: to be smothered in it, as the remedy for consumption has been, for seventeen years past, under the feet of the cavillers, the sycophants, and the communistic freebooters of science.

We hear much of the labour-strikes of the many-handed multitude. This book may perhaps initiate the invention-strikes of the many-thoughted few, and thus in time teach the ignorant, the idle, the frivolous, the pampered, and the proud, that there are none to whom the truths and the progress of science may not be a matter of personal and paramount concern; that science is a force which can vindicate its own rights, and that every injustice perpetrated upon its votaries may recoil, multiplied a million-fold, upon those who abet, condone, or simply tolerate the perpetrators. Thus the mass of mankind may come hereafter to see that their truest interest can stand only if based upon the truest and most scrupulous morality.

The author has neither the simplicity to expect, nor the hypocrisy to pretend that he expects, the present work will have any such immediate consequences. The spread of a new idea is governed by laws as constant, if we only knew them, as the transmission of heat or light. He has pointed out some of the many forces which stand in the way of any public recognition or any general adoption and diffusion of his first discovery. Most of these forces, of which only a part have been indicated, because the others are better unmentioned, will only become extinct in the course of another generation and a half; it is not until then that the new truths contained in this book will have permeated the scientific caste to which they are directed: nor do there appear any means of hastening this result. That one third of the whole death-rate is due to diseases which *are now* preventable, that there are means of saving every year a half, perhaps (according to the extent and accuracy of application) three-fourths, of *one hundred and sixty thou-*

sand lives in England alone, is a thought that well might fire the heart, inspire the head, and nerve the hand of many a lover of his kind: but it will not, or it will do so in vain. It will shatter itself against the peculiar intellectual and social idiosyncrasies as well as against the instinctive corporate egotism of a numerous, an influential and, individually, a meritorious class. Nor would an appeal to the other social forces, or to those who direct them, be of any avail.

To whom could such appeal be made?

To the statesman?

He will point a speech with a sanitary conundrum, and think no more of the matter.

To the health-reformer?

He is all eagerness that the people should be dragooned into health, even as their forefathers were once dragooned into holiness, and he hopes to be one of the dragooners; beyond that he goes not.

To the man trained in the severe and patient methods of positive science?

He will be afraid to venture amid the discordant facts, the rash assumptions and the ever-shifting fallacies of the so-called science of therapeutics.

To the philanthrophist, our poor clipt and crest-fallen substitute for the old knight-errant?

Even he will fail to see that there is here the means of doing more good, than by the endowment of many charities.

To the Press?

We know that if the waves of Public Opinion are to be stirred, the first and one thing necessary is to raise the wind.

All that can be done is now, once more, as seventeen years ago, to lay the whole facts before those whom the matter personally concerns, so that perchance, here and there, a few may be snatched like brands from the burning—some in time, some only, alas! too late. Perhaps among the former will be found, in this age of universal benevolence, at long, very long intervals, *one* whose interest in the matter will not cease with the attainment of his own safety: let him think of the ignorant who will not, and of the poor who cannot do like himself, and hold out a hand to both.

As for the author, he is afraid this book will hardly help to mitigate the bitterness of antagonism which he has met with from many of his professional brethren, particularly here in his own country, yet he trusts the time may come when even they will do him justice.

16 Devonshire Street, Portland Place.
London: *February* 1875.

Chateau d'Hargeville, par Septeuil,
Seine et Oise, France.

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CONSUMPTION AND THE HYPOPHOSPHITES.

CHAPTER I.

THE FREQUENCY OF CONSUMPTION.

Mortality of consumption.

1. Of all the diseases to which man is subject, Consumption, also called Pulmonary Phthisis, is the most frequent, and the most constantly fatal. The deaths caused by it average one-seventh of those produced by all diseases together; but sometimes the proportion is much higher, as high even as one-fourth. A few figures will make this plain.

England.

2. In the years 1848, 1849, 1850, and 1851, the number of deaths from phthisis in England was respectively 51,633, 50,299, 46,614, and 49,166. It caused in the last of those years nearly thirteen in every hundred deaths, and was fatal to 2·781 in every 1,000 of the population (Registrar-General's Fourteenth Annual Report, p. 130). Of 420,000 deaths (taking round numbers) which occurred in England in 1857, 50,106, or nearly one-seventh, were due to this single disease (Copland, p. 151). So of 515,329 deaths in England in 1870, 54,231 were caused by this one disease (Registrar General's Report for 1870). In the same year we find that consumption destroyed 22,000 more persons than any other single disease, except bronchitis.

Vienna.

3. In 1856 the whole number of deaths in Vienna amounted to 20,577, of which 5,829, or more than one-fourth, were due to the various forms of tuberculosis, the chief of which is consumption.—'Medical Times,' January 9, 1858.

United States.

4. According to Frick, the mortality from consumption, compared with the whole number of deaths, in the principal cities of the United States, is as follows: New York, 1 in 7; Boston, 1 in 6; Baltimore, 1 in 6; Philadelphia, 1 in 8. Lee states that the proportion throughout New England varies, as in Europe, between 1 in 7 and 1 in 4.—'Journal des Connaissances médicales pratiques,' October 30, 1867.

Paris.

5. In Paris, which has a population of 1,851,792 inhabitants, according to the census of 1872, the deaths in the week ending March 28, 1873, from all causes were 878; and 163 of these were caused by pulmonary phthisis ('Le Temps'). In the week ending September 12, 1873, out of a total of 936 deaths, 144 were caused by pulmonary phthisis. In the Parisian hospitals the number of deaths caused by consumption sometimes exceeds that of all other diseases put together. Thus in September, 1867, the number of deaths in the hospitals was 412, of which 250, that is to say, five-eighths of the whole, were owing to consumption alone.—'Journal des Connaissances médicales pratiques,' October 30, 1867.

Throughout the globe.

6. The author of one of the most learned and exhaustive treatises on the subject expresses himself as follows: 'At a moderate calculation, according to the estimated population of the earth, and the almost universal prevalence of the disease, from eighty to one hundred millions of its present inhabitants will meet with a premature death from one form or other of it. It destroys annually nearly one-sixth of the population of this country, and comprises perhaps one-fourth of the practice of physic and surgery.—Ancell on 'Tuberculosis,' London, 1852, Preface, p. 10.

7. There is another aspect of this matter which is particularly striking. If we examine the mortality at different ages, we find that consumption kills nearly as many people in the prime of life as all other diseases put together. Thus Dr. William Farr, F.R.S., in a letter to the Registrar-General on the causes of death in England (printed in the Fifteenth Annual Report of the Registrar-General, p. 66), says, 'Consumption is the greatest, the most constant, and the most dreadful of the diseases that affect mankind. It is the cause of *nearly half the deaths that happen between the ages of fifteen and thirty-five years*, and during one year was fatal in 50,594 cases. Tabes mesenterica is the form of tubercular disease chiefly incidental to children; 4,700 deaths were referred to this cause; 8,289 to hydrocephalus, or water on the brain, and 2,580 to scrofula affecting the glands and bones.' Copland (on 'Bronchitis,' p. 153) gives, on the authority of Ancell, a table compiled from the returns for England in 1847, and taking the deaths between the ages of twenty and forty, we find that out of a total of 59,986 deaths from all causes, no less than 24,310 were caused by consumption. Of 2,128 persons who died in London, between the ages of twenty and forty, during the first quarter of the year 1858, nearly one-half (938) were victims of consumption. If the comparison is made to bear upon a longer period of life, the proportion is smaller, but still very high. For the same quarter of the year 1858, between the ages of twenty and sixty, the share of consumption was 1,547 out of 4,967, or nearly one-third. **Mortality in prime of life.**

8. Bouchardat ('Annuaire de Thérapeutique,' 1861, p. 371) says, 'Pulmonary consumption is the most fatal of all diseases, and selects its victims among that part of the population which has arrived, or is about to arrive, at the most active period of life. It is the chief cause of premature death among the working classes of towns; so **Influence on public welfare.**

that the origin and prevention of this fatal malady constitute a social problem of the very highest importance.'

From twenty to sixty is the working time of life, when, instead of being dependent upon others, the individual becomes an active member of society. A cause of destruction operating extensively upon the efficient part of the population, is therefore peculiarly a matter of social importance. Not to speak of the loss in productive power to society at large, it is evident that nearly one-third of the amount of physical and mental distress flowing from a state of orphanage or widowhood, is in civilized communities attributable to the single disease *Consumption*. There is another reason why the distress produced by consumption bears with peculiar severity upon the labouring classes. The average duration of the malady varies between one and two years, during the latter half of which the patient is usually incapacitated from work. Hence his resources, and those of his family are strained to the utmost, or altogether exhausted, before death comes in to close the scene.

The amount of suffering and destitution produced by this cause throws all other afflictions into the shade. Pestilence, famine, revolution and war, are fitful noisy pigmies compared with this silent, slow, and unceasing destroyer.

Consumption as preventable as small-pox.

9. Since my discovery of the curative effects of the hypophosphites, consumption is as preventable a disease as small-pox; and there is no scientific reason, although there are too many social and class ones (449, 450), why the mortality it produces, instead of being summed up in England for instance by tens of thousands, should not dwindle down to a few hundreds per annum. After seventeen years experience of the use of this remedy, I can only reiterate this assertion in the same decisive terms as when it was first made. The proof will appear in what follows.

CHAPTER II.

THE CURABILITY OF CONSUMPTION.

Importance of auscultation.

10. UNTIL the discovery of auscultation by Laennec, in 1822, consumption was not looked upon as altogether incurable. It was frequently confounded with chronic bronchitis and pneumonia, and was therefore occasionally thought to terminate favourably.

Incurability of phthisis.

11. Since Laennec's discovery has enabled us to ascertain the precise seat and nature of the diseases of the respiratory organs, and thus to distinguish during life between those that are tubercular and those that are purely inflammatory, no point in pathology rests upon a broader basis of ascertained facts, nor upon a more general consent of pathologists, than that of the almost complete incurability of phthisis. This will be seen from the following quotations :—

Laennec.

12. 'We must confess that art does not possess any certain means of curing consumption. We cannot be mistaken as to the incurability of any malady when we see almost every known medicine tried against it; when remedies the most dissimilar and the most directly opposed to one another are employed; when every day new means are proposed, and old ones again dragged forth from the oblivion into which they had justly fallen; when, in short, we meet with nothing fixed but the use of palliatives and of means for fulfilling purely symptomatic indications.'—Laennec, 'Traité de l'Auscultation,' 3rd edition, 1831, t. ii. p. 172.

Frank.

13. 'The mere words "confirmed phthisis" clearly

express the prognosis. Medicine has made so little progress in the treatment of this disease that the prognosis of practitioners of different ages is exactly the same as that of physicians of our own day.'—Joseph Frank, 'Pathologie médicale,' t. iv. p. 293; edition of the 'Encyclopédie des Sciences médicales.'

Maygrier. 14. 'Phthisis which has reached the second stage is generally regarded as incurable, much more so when it is in the third stage.'—Maygrier, 'Dictionnaire des Sciences médicales,' 1820, t. xlii. p. 103.

Andral. 15. 'Until the researches of Laennec, phthisis had been regarded as necessarily ending in death; this celebrated observer showed the possibility of cicatrization of tubercular cavities. Bayle, who was not aware of this fact, thought that in the few cases where individuals recover after having presented all the rational signs of phthisis, they had only suffered from chronic bronchitis. But in several such cases the existence of cavities has been proved by auscultation. . . . . . Still, though a cavity may be cicatrized, it is not necessarily followed by recovery. This, on the contrary, is very rare, and can only take place when there are no other tubercles in the lung than those which occupied the place of the cicatrized cavity. But even in this last case there is only a suspension of the symptoms, and the cure is but momentary, because *the fatal predisposition which first produced the tubercular matter nearly always, after a certain time, produces it again.* Nothing, however, has yet been adduced to prove that tubercles themselves can be absorbed and disappear, so that if there be any chance of recovery in phthisis, it is only when it has reached the last stage of the lesion which constitutes it. But this chance is very small, and *the prognosis is almost invariably fatal.*'—Andral, 'Cours de Pathologie interne, recueilli et rédigé par Amédée Latour,' 1836, t. i. p. 509.

Louis. 16. 'Phthisis nearly always ends in death after a period varying from a few weeks to several years.'—Louis, 'Recherches sur la Phthisie,' 1843, 2nd edition, p. 569.

17. 'The termination of well-marked phthisis is always fatal. The end comes sooner or later, in a few weeks or a few months, according to a multitude of circumstances, such as the constitution, the complications, the more or less judicious care bestowed on the patients. . . . . . Phthisis is fatal in the immense majority of cases. We may relieve the patients afflicted with it and prolong their lives; we cannot cure them. Whether the tubercles be few and scattered or not, whether they be crude or softened, the case goes on to a fatal termination. The reason of this fact is plain; *the same predisposition which originated the first tubercles produces fresh deposits of tubercular matter*.'—Piorry, 'Pathologie iatrique,' 1843, t. iv. p. 552. Piorry.

18. 'Phthisis when extensive cannot be cured by any remedies at our disposal, but it would be wrong to conclude that we cannot relieve the patients by judicious treatment, local as well as general, hygienic as well as medicinal. In a great number of cases I have been able to subdue the febrile action, the cough, the dyspnœa (at least while the patient is at rest); in a word, I have been able to reduce the symptoms to their simplest form; but this improvement has been only temporary.'—Bouillaud, 'Nosographie médicale,' 1846, t. ii. p. 603. Bouillaud.

19. 'It is useless to dwell upon the fatal character of phthisis. It carries off nearly all those who are affected with it. Still we have proved that it might be checked or even cured in some few quite exceptional cases.'—Grisolle, 'Traité de Pathologie interne,' 6th edition, 1855, t. ii. p. 505. Grisolle.

20. 'The tubercular disease when established is beyond our power. The inflammation which is incidental to it we may hope to alleviate or remove. . . . . . The poor are necessarily much exposed to those causes Watson.

which tend to complicate the tubercular disease. This may as yet be slight and limited, but the superadded mischief, the bronchial and vesicular effusion, may be very great, and this being submitted, often for the first time, to treatment upon their admission into an hospital, is for a while removed.'—Watson, 'Lectures on Physic,' 1857, vol. ii. p. 209.

Wunderlich.

21. 'Death is the termination of almost all cases of confirmed phthisis.'—Wunderlich, 'Handbuch der Pathologie und Therapie, 2e Auff, Stuttgart, 1856, Bd. iii. 2e Abth. S. 424.

Monneret and Fleury.

22. 'Phthisis ends nearly always in death, and it is now generally admitted that the cases of recovery are so few, that the prognosis is almost always fatal.'—Monneret and Fleury, 'Compendium de Médicine pratique,' t. vi. 1845, p. 531.

Barthez and Rilliet.

23. 'Is tuberculosis curable? This question, which has formed the subject of many treatises, has been answered in the affirmative by a good many pathologists; but it must be confessed that recovery is altogether an exception.'—Barthez and Rilliet, 'Traité clinique et pratique des Maladies des Enfants,' 2e edition, 1854, t. iii. p. 383.

Clark.

23A. 'The total inefficacy of all means hitherto adopted for diminishing the frequency or reducing the mortality of this class of diseases, is of itself sufficient incitement to us to seek for some other method of remedying the evil.'—Sir James Clark, on 'Pulmonary Consumption,' London, 1835, Preface, p. 11.

Farr.

24. 'Hitherto medicine has been able to effect little for the cure of confirmed phthisis, although there can be no doubt that attacks are warded off, and that life is prolonged by change of air, regimen, and the judicious administration of remedies.'—Dr. Farr, F.R.S., Appendix to Fifth Report of Registrar-General, 1843.

Porter.

25. 'A disease, which is the great terror of the

country, and which has hitherto defied all human skill, and entirely baffled medical science.'—H. W. Porter, Paper read before the Institute of Actuaries, 1860.

Crisp.

26. 'Notwithstanding the sanitary measures adopted in England and other countries, there is reason to believe that consumption is on the increase.'—Dr. Edward Crisp, British Association, 1868.

Walshe.

27. 'The proportion of recoveries is unfortunately too small to justify us in going further in any individual case than the admission that release from the incubus of phthisis is not an absolute impossibility.'—Walshe on 'Diseases of the Lungs,' 1871, p. 467.

27A. 'The phrase "the curable stage" of phthisis constantly used to designate the earliest morbid condition, while the disease is as yet locally undeveloped, appears to me to signify erroneous views. I do not believe any stage of the disease is more surely curable (in the sense of curable by art) than another; and the most satisfactory examples of practical recovery I have witnessed have occurred subsequent to excavation.'—Walshe on 'Diseases of the Lungs,' 1871, p. 482.

Supposed curability.

28. From the preceding quotations it appears that the fatal character of consumption is one of the best established and most melancholy truths in pathology.

The few writers, such as Copland and Graves, who are not altogether of this opinion, go no further than to assert that the prognosis of any one particular case is not necessarily fatal at the outset, but they do not support their opinion by any clinical proof, nor by any series of cases.

Copland.

29. Copland (on 'Bronchitis,' p. 117) admits the curability of consumption in a general way, and states that it is an object always to be kept in view till a far advanced stage. He says that he has witnessed several cases of recovery, and in support of this statement gives *one* instance quoted from the 'Autobiography of Leigh

Hunt,' in which the patient did not recover, but life was prolonged to its ordinary duration.

Conflict of opinions.

30. This fact of the incurability of phthisis has, however, gone through several fluctuations of opinion before becoming finally established. About thirty years ago the profession were, for a time at least, divided in sentiment on the subject.

There were at that time two opposite tendencies to be found among practitioners according to their own desponding or hopeful temperament. According to one set, the disease was absolutely and necessarily fatal, and the result would be exactly the same, whether the patient were subjected or not to medical treatment. Another set were always hopeful, and although the individual instances of recovery, which the most fortunate of them might have observed, were to be counted up by units, they still supposed that any given individual patient might be the happy drawer of the extraordinary prize they attempted to secure for him. A little scrutiny into facts will show the very frail basis upon which such expectations really rested. They were deduced from two reasons, one referring to the pathology and the other to the diagnosis of the complaint.

Pathological data.

31. The first reason was, that in individuals having died of other complaints, post-mortem examinations occasionally showed that they had once suffered from tuberculosis, which had been arrested, or had even ended in recovery. This was first pointed out many years ago by the researches of Laennec, subsequently confirmed by those of Boudet ('Archives générales de Médecine,' 1843, 4e serie, t. i. p. 236), of Rogée (Essai sur la Curabilité de la Phthisie pulmonaire, 'Archives générales de Médecine,' 3e serie, 1839, t. v. p. 473), of Valleix (Considérations sur les Lésions anatomiques, et sur la Curabilité de la Phthisie, 'Archives de Médecine,' 3e serie, 1841, t. x. p. 293), of Barthez and Rilliet, and latterly, by those of Hughes Bennett.

32. The other reason for hoping for the cure of consumption arose from the advances made in the diagnosis of the early stages of the disease. While pathologists were demonstrating the possibility of phthisis sometimes ending in recovery, Jackson of Boston, and Fournet ('Recherches sur l'Auscultation,' Paris, 1839) were studying, with particular care, the earliest stethoscopic signs of the disease. The former had discovered a new auscultatory sign, prolonged expiration, by which the local deposit might be detected in its incipient stage, and at an earlier period than had until then been thought possible. Thus, from the twofold circumstance that phthisis did occasionally stop short of death, and might by a practised auscultator be detected at its earliest outbreak in the lungs, it was hoped that if taken at the very outset it might be found more amenable to treatment than when medical aid is called for at a later period. Twenty years' experience has shown that this expectation has not been justified by results. Practitioners who still think they have any scientific grounds to hope for the recovery of a given case, even in its earliest stage, under ordinary treatment, are in reality only men who are behind their time. Improvement in diagnosis.

33. With the exception of the hypophosphites no mode of treatment hitherto known shows greater efficacy against the earliest stage of the disease than against its latest (17, 27A). If we make proper allowance for the chances of error in diagnosis, when the tubercular matter has not reached the stage of softening, and when consequently there is no pathognomonic sign which enables us to distinguish with certainty congestive or inflammatory induration from that produced by tubercular deposit, it will be found that the final prognosis is very nearly the same at all stages of the disease, and that in nearly all it is fatal. Inefficacy of ordinary treatment.

This melancholy fact is superabundantly proved by the recorded experience of a host of experimenters and observers, who for a number of years past have tried remedy after remedy in vain. Next to him who succeeds, the man whom we should honour most is he who tries and fails. Success is often a matter of chance, of circumstances over which the man himself has no control; but the will to break from the barren aimless track of routine, beaten by the weary feet of unsuccessful predecessors; the attempt, even when made in vain, to explore the fresh untrodden realms of the unknown lying on either hand, is a merit we cannot applaud too highly. I confess that for my own part it is with a feeling of both sympathy and respect that I trace the struggles of those who, in our own branch of knowledge, have laboured on through doubt and darkness, and too often in spite of neglect or obloquy, towards the goal at which we all aim—the alleviation of human misery; nor do I envy the feelings of the man who can sneer or rail at their shortcomings in a path where failure is so often the lot of the best. Not only, therefore, do I feel inclined to award their due meed of praise to those who in our times have striven to discover some new remedy for phthisis, but I am ready to accept their own statement as to the results of their treatment. Even with this allowance, however, I cannot find that any real progress has been made towards the discovery of a remedy for phthisis, and whoever will take the trouble to examine the proofs adduced in support of the curative action of the different remedies proposed for the last twenty years against consumption, such as iodine, tartar emetic, chlorine, cod-liver oil, &c., as set forth in the writings of Scudamore, Sir James Clarke, Pascal, Campbell, Giovanni de Vittis, Gannal, Bricheteau, J. Hughes Bennett, Amédée Latour, Piorry, Chartroule, Burslem, C. J. B. Williams, Hastings, &c., will, I think, arrive at the same conclusion. So long as medicine rests upon the same uncertain basis as in the time of Hippocrates, that of individual *experience*, so long will it be impossible to draw from the clinical records of individual observation any exact data for the advancement of medicine as a positive science. Admitting that all the averments of the authors just named are free from error, the fact that in a certain number of cases a certain mode of treatment was followed in some few instances by recovery, affords no data for calculating what may be the probable issue in any given case, unless we are told, or can ourselves discover, what were the conditions in each mode of treatment, which brought about that result. Positive science is the application of definite means to a definite end. In the reports of the use of all the remedies introduced of late years in the treatment of consumption not only is there no precise and definite statement of the conditions of success or failure, but when we come to examine matters more closely we find that even on the most partial view, the favourable results seldom or never amount to more than a proof, that recovery is sometimes possible—a point which, as we have already seen, was long since established by pathological anatomy. All hitherto claimed for any of the remedies above mentioned, and for many others I have passed over, comes in fact to this, viz.:—that a cure was obtained in a very small proportion of cases out of a total which is seldom indicated, but which we can usually ascertain to have been very large. The following quotations will bear out these assertions.

34. Bricheteau ('Maladies chroniques de l'Appareil respiratoire,' Paris, 1851) has published as examples of cure in phthisis, one case in the first stage, one in the second, and seven in the third, observed by himself under the use of tartar emetic, and he has collected nine other instances from the medical journals; but it took him *twelve years* to collect these eighteen cases. **Bricheteau.**

35. Hughes Bennett ('Pathology and Treatment of Pulmonary Tuberculosis,' Edinburgh, 1853) has published **Hughes Bennett.**

four cases of cure in the third stage observed by himself, due to a spontaneous arrest of the disease, and eight others under the use of cod-liver oil. If we consider that Dr. Hughes Bennett is an able and well-known specialist, that as Clinical Professor of the University of Edinburgh, he has the practice of a large hospital, and that it took him nine years to collect these *twelve cases*, it follows that though they prove the possibility of a cure in phthisis, yet they do not in any way modify the generally admitted prognosis.

Brompton Hospital First Report.

36. According to a First Report published ('Medico-Chirurgical Review,' No. 10, 1850, p. 321) by the physicians in charge of the Brompton Hospital, there was relief in twenty-five per cent. of the patients there treated in the second and third stages; slight improvement in eleven per cent.; arrest of the disease for a time in six per cent.

Cotton.

37. Two years later there had been no progress in this respect, for Dr. Cotton ('The Nature, Symptoms, and Treatment of Consumption,' London, 1852) gives as the result of the treatment of forty-one cases by cod-liver oil among the out-patients of the Brompton Hospital, and therefore among the most favourable cases, the following figures: In sixteen patients in the second stage, six cases of great improvement, and four of slight improvement. In twenty-five cases in the third stage, four of great improvement, and four of slight improvement. So that in four years the Brompton Hospital, though specially founded for the discovery of a remedy for phthisis, was not able to publish a single case of cure out of many hundreds of patients (490).

Brompton Hospital Second Report.

38. Walshe, in the first edition of his book on Diseases of the Lungs (1854), states that the number of cures obtained at the Brompton Hospital, from 1849 up to 1854 was 4, ¼ per cent.

In 1863 a Second Report of the Brompton Hospital was published, which may be summed up as follows: 'The whole number of cases treated at the Hospital during the nine years which have elapsed between 1854 and 1862 was 6,001. In 251 of these cases there was an arrest or cure of the disease, that is to say in 4·1 per cent. of the cases, or in the case of about one patient in twenty-five. But these 6,001 cases treated as cases of phthisis, must be distinguished into two classes, one class consisting of 537 cases of *suspected* phthisis, in which there were forty-one cases of arrest or cure, that is to say, about 8 per cent.; and 5,564 cases of *undoubted* phthisis, in which there were but 210 cases of arrest or cure, that is to say, only 3·8 per cent. (490). It follows that the maximum of results obtained at the Brompton Hospital by the combination of residence in the house, hygienic means, and the ordinary therapeutic agents (such as cod-liver oil, iron, quinine, alkalies, &c.), was four per cent., or one case of *arrest* of the disease in twenty-five patients.'—'Second Medical Report of the Brompton Consumption Hospital,' London, 1863, p. 28.

39. But to the foregoing must be added the fact, that in their Report the physicians of the Hospital expressly warn the reader that the 210 cases of *undoubted* phthisis reckoned as *cured*, ought rather to be regarded as only an arrest of the disease, although that arrest *often*, as they say (that is *not always*), is equivalent to complete restoration of the general health. This already small proportion of favourable results must therefore be further reduced, so that there remains but a very small figure indeed. The proportion of 4·1 per cent., published in 1863, is almost identical, though slightly less than that noted above as given by Walshe in 1854, so that from 1849 to 1854, and from 1854 to 1863, there was no progress, and the absolute powerlessness for curative purposes of all the ordinary treatment of the Hospital was so manifest that the physicians of the establishment (Drs. Roe, Cotton, Remarks.

Quain, Scott-Alison and Pollock) in their letter to the Governors of the Hospital, placed at the head of the Report (p. 5), expressly say, 'The question of treatment has been purposely passed over in silence. We have thought it better to leave it in the hands of the individual members of the medical staff who have discussed it in their works, or in the medical journals.' In a hospital founded for the special purpose of discovering or determining the best method of treating phthisis, the conclusion reached at the end of fourteen years of experiment, was simply this, that the results obtained in respect of cures are the same, whatever be the treatment employed; and that what is known on the subject of the means of cure, is exactly what was known before —nothing. While I am writing these lines I find that the authorities of the Hospital have recently published data of a different kind, to which reference will be made later on (490).

Austin Flint.

40. Austin Flint ('American Journal of the Medical Sciences,' January, 1858, p. 53) has published twenty-four cases of cure observed by him, of which two were in the third stage; but these results are open to the same objections as those of Hughes Bennett (35). Dr. Flint stands high in the United States as a specialist; he has a large hospital practice, and yet it took him *fifteen years* to collect these twenty-four favourable cases.

Piorry.

41. The same remark applies to the last published opinion of Piorry in 1859, in a memoir read to the Academy of Medicine ('Sur la Curabilité et le Traitement de la Phthisie pulmonaire, et des Tubercules,' dans la 'Gazette Hebdomadaire,' October 21, 1859), wherein he expresses himself as follows: 'Is there any medicine which is of use by acting on the various stages of the indurated masses that surround or separate tubercles? Thousands of facts collected during many years past, in the practice of La Pitié and La Charité, justify an answer in the affirmative. There is now no doubt that prepara-

tions of iodine, given by fumigation, internally, or by friction, &c., modify very advantageously the disintegration of tubercles. Under the influence of iodine combined with prolonged and frequent inspirations, I have seen tubercular indurations diminish in extent, the symptoms of the disease sensibly diminish, the appetite return, the heart recover its volume, and the adipose tissue fill up. I have seen this improvement continue for months, and in some cases for years. But it must be confessed that the number of really radical cures is very small, and I cannot remember *more than a dozen* in all.' A remedy which out of several thousands of cases produces only twelve cases of cure, can scarcely lay claim to much share in the result.

C. J. B. Williams.

42. The most important opinion on the point in question is that of C. J. B. Williams, and I commend to the careful meditation of my readers the result of his experience during twenty years practice in the treatment of phthisical cases. He says: 'I have notes of *seven thousand cases* of phthisis, and I find the average duration of life under the disease has been four years; they have terminated in the immense majority of cases in death. The experience of Louis and Laennec gave an average duration of two years; so that by the introduction of cod-liver oil and other agencies we have lengthened the period and doubled its duration. What further? This is only a minor success—a prolongation of life. Can we claim success—a cure? It is doubtful: I can hardly say. I have notes of patients who, having presented the usual unequivocal signs of phthisis, have lived afterwards from two to eighteen years in comparatively good health; but it were hard to say whether they were perfectly cured. Phthisis is a constitutional disease, and it is hard to change the constitutional character (15, 17). I have notes in this period of only *twenty-four* cases to which the word "cured," could be applied. They have gone on from two

to eighteen years in fair health, and filling their places as useful members of society. Of partial cure, cases in which the duration of life has been prolonged beyond the average of four years to a longer period, I have *thirty-one* cases of prolongation from six to thirty-one years. They have passed these years in a considerable degree of comfort, and with the ability of fulfilling their social duties, and partaking in rational pleasures. These persons are now living; their life has been rendered useful and comfortable, and they may yet live for many years. I have another set of cases in which, although *death has followed in almost, if not quite all of these*, life was prolonged to a considerable extent. There are twenty cases in which it was extended from six to sixteen years. These three classes make up in all seventy-five cases. These are all the successes of which I can boast.'—Dr. C. J. B. Williams Lumleian Lectures on 'Failure and Success in Medicine,' 'The Lancet,' April, 1862.

emarks. I have but two remarks to make on the foregoing. The first is that the profession and the world at large are deeply indebted to Dr. Williams for the plain and straightforward statement here quoted. His rank as a general pathologist, his skill in the diagnosis of diseases of the respiratory organs, and his long experience as a practitioner, all concur to give his opinion on the subject, as much weight as that of any man living. Now upon this opinion it must henceforward stand upon record that the *chances of recovery of any given case of phthisis treated by cod-liver oil*, even in the hands of the most skilful physician, scarcely exceed *one in a hundred.* My second remark refers to Dr. Williams's apparent hesitation in claiming the successful results as instances of cure. I will try to help him on that point. Supposing he were charged by the Royal Medico-Chirurgical, or any other society of which he is a member, to report upon the efficacy of some new mode of treatment in small-pox, syphilis, or cancer, and found on examination that the number of recoveries under the new mode of treatment was barely *one per cent.*, would he report that such results were to be referred to the treatment employed, or would he not rather assume they were owing to fortuitous and as yet undiscovered circumstances? As for the prolongation of the average duration of life, from two years to four, even this advantage, slight as it is, can hardly, upon really scientific grounds, be assigned to the action of cod-liver oil. The cases observed by Laennec and Louis were those of underfed inmates of a French hospital subjected either to an expectant or an antiphlogistic treatment. Dr. Williams's patients were many of them of the higher classes of society, and probably in the habit of taking a fitting quantity of animal food. It would therefore be requisite to ascertain the influence of these conditions, before attributing the difference Dr. Williams has noted to the action of cod-liver oil as a remedial agent.

Dr. Chambers.

In the face of such facts, and of statistical conclusions resting on so large a basis, I cannot understand how men like Dr. Chambers can talk of cod-liver oil as a *rational* mode of treatment. If such expressions signify anything at all, they mean that we know the reason why cod-liver oil cures consumption, *i.e.*, the primary physiological modification which it produces in the organism, and which is followed by the cure of the disease. But it will hardly be denied that *one per cent.* of recoveries amounts to no *cure* at all; consequently, to assert that we have a rational knowledge of the action of cod-liver oil in phthisis, only means that we have discovered the cause of a *non-existing* effect. So much for one way of viewing *rational medicine.*—Chambers on the 'Mode of treating Pulmonary Consumption,' 'Medical Circular,' June 4, 1862, p. 403.

Climate.

43. The influence of climate in the treatment of consumption was formerly thought of greater importance

than the use of remedies. The best and most experienced physicians are now of opinion that climate has no action upon the constitutional condition, that is, upon the essential cause of tuberculosis (15, 17, 42); but only influences occasionally the inflammatory complications. Dr. Williams speaking of the results of warm climates in the treatment of pulmonary consumption as exemplified from an analysis of 251 cases, says: 'The statistics showed plainly that life was prolonged by a residence abroad, though to a small extent, the average for each patient being 2½ winters.'—'Lancet,' May 4, 1872. This question will, however, be more fully examined further on. (220, 423—437).

Conclusions.

44. To sum up, the present state of medical science upon this point cannot be better expressed than in the words of Louis, which are as strictly true now as they were thirty years ago: 'The study of phthisis, viewed with regard to its curability, is very little advanced. . . . for in the cases of recovery hitherto met with, the result has been obtained, not by some fortuitous, but nevertheless cognizable circumstance which can be more or less easily reproduced, but by *individual circumstances hitherto entirely unknown*, and to the discovery of which the physician should henceforth steadily devote himself.'—Louis, 'Phthisie pulmonaire,' p. 573.

If the views I hold with regard to the cause of phthisis be correct, the hitherto undiscovered circumstance alluded to by Louis, is the restoration of the normal quantity of oxydizable phosphorized compounds contained in the system, which can be obtained at will by the proper use of the hypophosphites.

The greater part of what precedes was published by me in the 'Medical Circular' of 1862 and 1863. It is consequently more than ten years old. Since then the opinions of medical men as to the curability of phthisis, have been somewhat changed, and this has been effected in a great measure, if not altogether, by my discovery of the curative action of the hypophosphites. It is indispensable, however, that the preceding quotations should be reproduced here, in order that the reader may keep in view what was the real state of medical science on the subject up to and for a few years after, the publication of my discovery. I shall have occasion to refer later on to these opinions in support of my line of argument, and it is good they should be placed upon record, as the time is not very distant, when they will be regarded only as historical curiosities (487—492).

CHAPTER III.

HISTORY OF THE DISCOVERY OF THE SPECIFIC REMEDY FOR CONSUMPTION.

Tubercle the characteristic of consumption.

45. CONSUMPTION or pulmonary tuberculosis is owing to the deposit in the lungs of a peculiar substance called tubercle. This tubercular matter after remaining for a longer or shorter time in a quiescent state undergoes a transformation, characterized by softening and disintegration accompanied by inflammation, which in the great majority of cases eventually leads to the destruction of the surrounding tissues.

Three theories of tuberculosis.

46. The nature and causes of this special deposit have for centuries exercised the sagacity of the medical profession. The theories which have been formed to account for it are multitudinous. The most important of them will be given in the eighth chapter (310—315), and as we shall see, they may all be summed up under the three following heads. First, according to the anatomical school, tubercle is a retrograde or incompletely developed histological element, incapable of further organization. Second, according to the vitalist or physiological school, the fundamental character of the tubercular constitution is a general weakness of the system, proceeding from a disturbance of innervation and sanguification. Lastly, according to the humoral or iatrochemical school, the origin of this disturbance and general debility is a special change in the albuminoid or protein substances in the system, which leads to a deposit in different organs of ab-

normal substances, which can neither undergo assimilative metamorphosis, through the action of the capillaries, nor normal excretion, through that of the lymphatics. Such was the ultimate limit which had been reached by medical science in 1855, when I first endeavoured to find the solution of this problem.

Their incompleteness.

47. A very slight degree of reflection will suffice to show that each of these three different theories is derived from a correct, but partial and inadequate view of the subject. Consumption is in fact, owing to the development of a peculiar matter called tubercle. It is characterized by general weakness of a special kind, and it is very likely that this depends upon some peculiar modification of the process of nutrition. But when we have got thus far, the question is, What is the practical conclusion to be drawn from these theories? How can we arrest the deposit of this tubercular matter? How can we relieve this peculiar characteristic state of weakness? How can we restore the function of nutrition to its normal state? Such was the problem which I undertook to solve, and I cannot give a better account of the way in which I set to work, than by repeating the statement I laid before the Academy of Medicine in Paris, on July 21, 1857, which was as follows:—

My Memoir of 1857.

48. For the leading idea, which guided me in my investigations, and which I think will at last furnish the key to the mysterious morbid state called tuberculosis, I must go back to the month of February 1855, whilst I was practising in Havana. From the beginning of my medical career, I had occupied myself in researches on the treatment of phthisis, and at that time I was led to the following conclusions: —

'The tubercular diathesis can only depend on the disturbance of some one of the primordial functions of the system. From the connexion which exists between all parts of the organism, the starting point of this disturbance, or an essential condition of it, must be a modification of hæmatosis, or the blood-making process.'

Chemical pathological data.

49. 'The researches of different pathologists, and especially those of Andral and Gavarret, since confirmed by other observers, indicate that the variations of composition of this fluid in phthisis present no particular or distinctive modification of its organic elements. I was thus led to think that the special condition of the diathesis might possibly be found in the inorganic elements.'

'Upon this point, the results of chemical research being either incomplete or contradictory, I deemed a solution of the problem might be arrived at by the aid of therapeutic experiment, that is to say, by examining the influence which a change in the proportion of the inorganic elements of the blood would exercise on the progress of phthisis. The phenomena of this disease, compared with those of other dyscrasiæ, especially those of chlorosis, appeared to me to be attributable to the loss or diminution, rather than to the augmentation, of some essential element, so that I resolved to begin my experiments by seeking to increase the quantity thereof. What element should I begin with? Medical science was already in possession of numerous facts establishing the influence on the system of most of the inorganic principles of the blood. Iron, sulphur, either as a sulphide or a sulphate, the chlorides and the alkaline bases, are daily prescribed in medicine. All or nearly all have been tried in the treatment of tuberculosis; and although each of them has been extolled by turns, not one has shown sufficiently marked, nor, what is more important, sufficiently constant effects to induce us to attribute to it any real influence on the disease. (See Appendix I.) I therefore *provisionally* eliminated these elements from my calculation, with the idea of reverting to them, if necessary, and I decided to commence my trial with phosphorus. We know that this element is one of the constant principles of the system, but that is the limit of our science. Chemistry has not yet been able to prove in what state it is found in the blood, whether as phosphoric acid, or as phosphorus molecularly combined with organic material.'

Previous investigations: phosphates.

50. 'At this time I was unacquainted with the researches of Owen Rees, published in 1848, in the 'Philosophical Magazine,' and the part that he had assigned to this element, in the function of the globules, but independently of this analysis, I found the ground here also cleared before me by previous therapeutic efforts. The phosphates, and especially the phosphate of lime, had long been used in rickets. I knew that Dr. Beneke had proposed it in 1849 in Germany as a specific remedy for tuberculosis, and that other experimentalists had also made use of it. On examining these facts, however, I came to the conclusion that neither had this salt shown that immediate action upon the disease that, I thought, must be characteristic of the element, whose deficiency might be the starting point of its constitutional cause.'

Phosphorus.

51. 'I was thus lead to the study of phosphorus itself in the simple or unoxydized state, and in reflecting on the physiological effects of this substance, especially as reported in Bayle's 'Bibliothéque de Thérapeutique,' it appeared to me that the remarkable phenomena of stimulation attributed to it, that its action on various morbid states of the system, might make it useful in the treatment of phthisis. But on the other hand, Barthez and Rilliet in their work on the diseases of children, after having quoted two cases of cure of tubercular meningitis obtained by Coindet as far back as the year 1802, by means of phosphorus, state that they had in their turn employed it, without obtaining even any momentary result. Here again I found myself stopped by negative and contradictory results. However, on reflection, it appeared to me possible to reconcile them.'

My theory.

52. 'Once admitted that the phosphorus principle

existed in the blood or in the organism in a different state from that of phosphoric acid, it followed that it must fulfil a twofold part in the system, that of a highly combustible or oxydizable substance, and that at the same time it should be capable of entering into molecular combination with the other elements of the system, so as to become an integral part of it. Now neither phosphoric acid, or its salts the phosphates, nor phosphorus itself fulfils this double condition. The first is already at its maximum of oxydation, the second when placed in contact either with the liquids of the stomach, or with the tissues, must, before being absorbed and becoming assimilated by the system, be transformed either into phosphoric acid, or at least into hypophosphoric acid, the degree of oxydation immediately inferior to phosphoric acid. In the first case the same result would be obtained as by the use of phosphoric acid itself, but only after risking the dangerous effects produced by the local chemical action of phosphorus in the uncombined state (474). In the second, supposing that the phosphorus before being absorbed was transformed only into hypophosphoric acid, this latter would on coming into contact with the alkaline principles of the blood, split up into two atoms of phosphorous acid and one atom of phosphoric acid ($P^3H^3O^{11} = 2\,PHO^3 + PHO^5$). The first would fulfil the two conditions above stated; but with the disadvantage of only representing, under the most favourable circumstances, two thirds of the phosphorus introduced into the stomach, the other third having become transformed into phosphoric acid and having thus lost its special action. Besides this, the action upon the system of the different preparations of phosphorus being thus supposed to depend upon the quantity of it still remaining in an oxydizable state at the time it was absorbed, its efficacy would vary according to a number of unforeseen circumstances, such as the excipient in which the remedy was administered, the age of the preparation, the nature of the substances it might meet with in the digestive apparatus, the rapidity with which it was absorbed, &c. These conditions, I fancied, shewed why the action of preparations of phosphorus was so uncertain, and how it was that Coindet had obtained a result by the use of large doses, whilst Barthez and Rilliet, with smaller ones, had only arrived at negative effects. Thinking I had thus found the key to these contradictions, I considered myself logically justified in assuming hypothetically the truth of the two following propositions':

'The tubercular diathesis is owing to a diminution in the system of the phosphorus element.'

'As this element fulfils the function of a combustible body it must be at a degree of oxydation inferior to that of phosphoric acid.'

The hypophosphites.

53. 'Having arrived at this point of my induction all that remained for me to do was to test it by experiment. I had the choice between the three lower compounds of phosphorus and oxygen, namely, the oxide of phosphorus, hypophosphorous acid, and phosphorous acid. My choice was determined by the following reasons':—

'The red modification of the oxyde of phosphorus is insoluble and very inflammable. The yellow modification, although itself soluble, forms combinations with bases which are hardly soluble, and very unstable. Besides which the preparation would have offered great difficulty in the circumstances in which I was placed.'

'I thought it likely that phosphorous acid would be much less active than hypophosphorous acid, being less combustible, since it contains three equivalents of oxygen to one equivalent contained in the hypophosphorous acid. Its only soluble salts are those of potash, soda, and ammonia, whilst the hypophosphites are all soluble in water. I therefore, chose, hypophosphorous acid, and I decided upon using it in combination with a base. The use of the free acid would very likely be of no particular advantage, as immediately after its absorption it would combine in the blood with the bases of the alkaline carbonates, and the administration of definite doses would be much more troublesome, as it would entail the necessity of determining each time the degree of concentration of the acid. I chose the hypophosphite of lime to begin with, owing to the special function in the system which that base was supposed to fill. I was quite in the dark as to the possible action of this salt upon the system. The only fact then known bearing upon the point was that toxicologists—among others Orfila and Devergie—were of opinion that the poisonous action of phosphorus on the system was owing to its transformation into hypophosphorous and phosphorous acids. I therefore felt it my duty to proceed with every possible degree of caution, and so resolved first to try the remedy on myself. I began by taking half a grain of hypophosphite of lime, which was gradually increased to six grains in one dose, which I found I could take without any ill effects.'

First tried upon myself.

First case treated with the hypophosphites.

54. Having thus established the physiological harmlessness of the remedy at this dose, I prescribed it for the first time on March 13, 1855, to a young married woman of 19, who was suffering from acute tuberculosis after confinement. Both lungs were completely infiltrated with tubercles in a state of softening. There was enormous distension of the abdomen, with acute pain on pressure, intense fever, and complete prostration; all the symptoms of peritonitis, and the patient was evidently dying. The first day she took one grain of hypophosphite of lime, on the third day the dose was raised to six grains, on the fourth day the patient was able to leave her bed, and was anxious for food. The change was so great, the improvement of the general symptoms, fever, weakness and night-sweats, was so surprising, the look of the

patient, above all, was so completely altered, that all about her, and I myself, were struck with astonishment. This improvement was kept up and went on increasing till the eighth day, when the patient died of perforation of the intestine.

Second case.

55. The second case treated with the hypophosphites was a young lady in Havanna, who had come under my care a year before for incipient phthisis, the symptoms of which had been combated by various means, such as inhalations and removal into the country. But in February 1855, the disease had recurred in spite of the means before used. The symptoms rapidly grew worse, and in the beginning of April she was in the following condition: Great emaciation, complete loss of strength and appetite, shiverings and fever in the evening, profuse perspiration about the neck and chest during the night, troublesome and almost continual cough, scanty mucous expectoration slightly streaked with blood, menstruation much decreased. On percussion, I found greatly diminished resonance in the whole upper third of the right lung, particularly in front; abundant moist crepitus over the same region, increasing during cough; loud respiration in the rest of the lung; the left lung appeared sound; there was no change in the voice. There could be no doubt as to the diagnosis of tubercles undergoing rapid softening, and the patient was immediately placed under the treatment of the hypophosphite of lime, beginning with four grains a day, which were soon raised to ten. Under the influence of this treatment all the symptoms rapidly improved. It was continued with occasional interruptions till the end of May. One month later, at the end of June, the patient was free from all general symptoms of the complaint, and I could find no trace of the physical signs I had met with in the month of April. Such is a summary of the first curative result obtained by the use of the hypophosphites. The case

will be found reported in full at p. 31 of my French work, 'De la Cause immédiate de la Phthisie,' etc, Paris, 1864. Ten years later this young lady, who had then been married for several years, was in the enjoyment of perfect health.

Summary of first series of results in Paris.

56. The total number of cases I had observed when I read before the Academy of Medicine in Paris the Memoir from which the preceding is an extract, was thirty-five. Of this number nine were completely cured, eleven had experienced great improvement, and fourteen had died; one was still under treatment.

'Of the nine cases in the first category, two were in the first stage, six were in the second stage, that is to say, they presented tubercles in a state of softening; the ninth showed a considerable excavation, occupying the upper third of the left lung. Three were cases of rapid phthisis; one of them a child seven years old, presented also decided symptoms of encephalitis. A single case was perhaps doubtful, the physical signs being confined to the base of the lung. In the patients in the first and second stage all the symptoms, both general and local, had entirely disappeared, and the lung seems to have completely returned to its normal state. In the ninth case, that of the patient with a cavity, all the general symptoms disappeared, the physical signs also were greatly improved; but there was still well-marked cavernous respiration, though without any crepitus, no cough, and only very slight completely transparent expectoration. One year after having left off the treatment, I heard from this patient that his health remained unimpaired, and that he felt himself strong enough to undertake an increase of business. I had news also of two other patients; they had remained in perfect health. I do not know what became of the others.

Of the eleven cases which had only improved, four were in the third stage with large cavities. In one of these cases the cavities occupied both lungs. The general results obtained by the treatment and the continued improvement shewn in two of these four cases, gave me every reason to believe that both would have terminated in recovery, had the treatment not been broken off. The other seven cases shewed marked improvement during the whole time of treatment, with the exception of one case, where there were intestinal complications. One of these patients, with a cavity occupying a great portion of one lung, was suffering from diarrhœa; this disappeared, and the improvement continued until the treatment was left off.

As to the fourteen cases which ended in death, I find that before beginning the treatment, six of them had very large or numerous cavities. In three of them cavities existed in both lungs, one was suffering from peritonitis, eight were affected with diarrhœa, and probably intestinal ulceration. In two of these cases the tubercular deposit occupied more than half of both lungs. In three cases one lung was completely infiltrated. In another case the upper portion of both lungs was diseased. In one case alone was the tubercular deposit limited to the apex of one lung: but in this case there was advanced laryngeal disease. In seven of these patients the disease was so far advanced that death occurred in less than one month after beginning the treatment. In four others it occurred in less than two months and a half; and in only three of these cases was life prolonged more than three months. These facts indicate that the patients were already in so aggravated a condition, that they were only likely to bring discredit on the treatment and its inventor. But I thought in a matter of this kind I ought to divest myself of all personal considerations, the more so as I wished to ascertain the difference between the results obtained in Europe, and those which I had observed in the tropics, where certainly several of these cases would have shewn more sustained improvement, and life would at least have been considerably prolonged.

Second series of results.

57. Such were the results I was able to bring forward in support of my discovery in the first public statement made on the subject in 1857. These were embodied in a book published in Paris in 1857. In 1862 I published a series of articles on the subject in the 'Medical Circular,' and in 1863 I published a second edition of the original French work, with full reports of 137 cases as observed by myself, treated by the hypophosphites, and 117 as reported by other observers. Since then, after more than ten year's further experience, and after having treated several thousand cases during twelve years at my public dispensary, Rue Larrey, Paris, and in my private practice, I feel myself fully justified in again re-asserting, in the most positive and peremptory manner, every one of the propositions laid down in my memoir, read before the Academy of Medicine on July 21, 1857, and repeated in another paper read before the Academy of Sciences on May 31, 1858, and which are as follows:—

Limits of the efficacy of the hypophosphites.

58.—1. The specific remedy for the tubercular diathesis or constitutional cause of Consumption consists in the use of a preparation of phosphorus combining the properties of being both assimilable and oxydizable.

2. When death takes place in cases treated by the hypophosphites, it is due either to the pre-existing lesions, or to the occurrence of some secondary or accidental complication.

3. In no case after the employment of the hypophosphites is death brought about by new tubercular deposit, unless the treatment is completely stopped while the patient is still exposed to the causes which produce tuberculosis.

The difference between the former state of science and that which is now established by the discovery of the curative action of the hypophosphites is this:

If ten consumptives be selected in such a state that there can be no doubt of the certainty of the diagnosis, and at such a stage of the disease that the pulmonary lesions shall be as little advanced as is compatible with such certainty, it is undeniable that no physician would pledge himself to cure a fixed proportion of them, or even any one single case selected beforehand, if he be debarred from the use of the hypophosphites or of some oxydizable compound of phosphorus. With every other resource at his command, the utmost he could do would be to promise that the life of some of them might be prolonged, that one, or at most two, might possibly escape, but without being able to tell who would be the fortunate exception, or who would prove victims to the disease. On the other hand, if any number of patients be taken in the conditions above indicated and subjected to the use of the hypophosphites properly given, nine out of ten of them ought to recover, the tenth case being allowed for errors of observation. So that the prognosis of a given case of phthisis either treated by ordinary means exclusive of the hypophosphites, or left to the course of nature, depends not on the actual state of the patient, but on the *nature* of the disease itself, and is nearly always fatal (15, 17, 27 A, 42); while the prognosis of the same disease under treatment by the hypophosphites is *independent of the diathesis* or constitutional cause, and rests altogether on the extent of the pre-existing lesions, that is, on the destruction of lung tissue already produced, or on the presence or absence of complications.

These propositions will be fully established in the next chapter.

CHAPTER IV.

ON THE PROGNOSIS OF CONSUMPTION WHEN TREATED BY THE HYPOPHOSPHITES.

Conditionality of the specific treatment.

59. As has been already said, positive science is the obtaining of definite ends by definite means.

The hypophosphites are the specific for phthisis under certain definite conditions; and so long as these conditions exist, but only so long, the prognosis is always favourable. To demand more is simply to overstep the limits of scientific possibility, and to ask for what is impossible or absurd.

Clinical proofs.

60. An analysis of the cases treated at my public dispensary, Rue Larrey, in Paris, during one twelvemonth, namely from December 2, 1857, to December 2, 1858, will show the conditions which determined the successful or unsuccessful results, and will be found to bear out my proposition as to the specific action of the hypophosphites.

The total number of patients who followed the treatment during that period was 154; of this number sixty did not follow the treatment properly, most of them were seen but once or twice. In order, therefore, to establish a fixed limit, in this number of sixty, whose cases have not been taken into account, are included all the patients who followed the treatment for less than one month. Of the ninety-four cases remaining, five were supposed to be consumptive, but were in reality suffering from chronic disease of a non-tubercular character. In ten other cases the tubercular nature of the disease was doubtful, or might have been objected to as not being sufficiently evident, and although several of these were evidently in the first stage of phthisis, as they recovered without going on to the second, I have considered them as doubtful, because, as is well known, at this period of the complaint the diagnosis may always appear open to doubt, when the disease does not go on to the second stage.

The usual classification has been followed, by distinguishing three stages in the complaint; the first, or crude stage, characterized by a modification of the percussion or auscultatory sounds without the production of any abnormal signs; the second, or period of softening, by the presence of abnormal crepitus in lieu of the physiological respiratory murmur; the last, or period of excavation, by the existence of cavernous rales and sounds.

I call *confirmative* results all cases in which there was continued improvement during the whole time of the treatment.

I call *negative* results all those in which the improvement did not persist during the whole time of treatment.

I call *definitive* results *in favour* of the treatment all the cases cured, and definitive results *against* it all the cases ending in death, from whatever cause, excepting only one or two cases which had been counted among the confirmative results, and in which death occurred more than a year after the treatment had been completely left off.

Extent of local lesion.

61. The first condition on which the cure of a case of phthisis by the hypophosphites depends, is the extent of the local lesion or amount of disorganization of the lungs. Among the seventy-nine cases referred to, the signs of tubercular disease were limited to one lung in twenty-five. In this number there were seventeen confirmative results, of which eleven ended in recovery, and eight negative cases, of which three were deaths. Fifty-four patients had tubercles in both lungs; twenty-five gave confirmative

results, of whom sixteen were cured; twenty-nine were negative cases, of which nineteen were deaths. Thus, when one lung only is diseased, the chances of cure are to those of death as eleven to three. But when both lungs are affected, the chances of cure compared with those of death are reversed, and fall as low as sixteen to nineteen.

First stage of the complaint.

62. With regard to the stage of the lesion, two patients when first seen were in the first stage, and one of these was a case of acute phthisis. Both afterwards showed the stethoscopic signs of softening, and both recovered. For the reasons already given (60), the other cases in the first stage are not reported. Every one of them that could be traced was found to have recovered.

Second stage, one lung diseased.

63. Fifty patients were in the second stage (that of softening). Of these eighteen had only one lung diseased, and of this number there were fifteen confirmative results, nine of them cures, and three negative results, including one death.

On referring to the reports of the three negative cases I find that in two of them it was expressly stated at the first examination that there was reason to suspect that the disease affected both lungs. In one (the fatal case) the probable existence of a cavity was expressly noted. The third patient followed the occupation of a street lamp-lighter during the winter, and was thus unavoidably exposed to circumstances productive of frequent and serious inflammatory complications. Hence it follows that when the disease has not passed the second stage, and it can be ascertained with certainty that it is limited to one lung, recovery takes place in all cases without exception, unless the patient be exposed to unusually unfavourable hygienic conditions.

It would be difficult to over-rate the importance of this fact, and it is the more striking as I cannot see that it is open to any really serious objection. The diagnosis of the extent of the lesion was written down in each case before beginning the treatment. Allowing the sceptical, however, any amount of latitude they please, and admitting that some of the cases were not cases of phthisis, still that supposition would not weaken the conclusion. The fact still remains the same—viz. that all the patients in the second stage, with only one lung affected, and who did not leave off the treatment, proceeded to complete recovery, and that not one of them died. To invalidate this conclusion, we must admit that of the whole seventy-nine patients treated at the dispensary, there was not one in whom the disease was in the second stage and limited to one lung, otherwise the conclusion not being contradicted by a single negative instance will still hold good, whatever be the number of cases on which it is founded. In reality, however, in these cases the simple fact of the stethoscopic signs being limited to one side, affords of itself, as is well known, a strong probability in favour of the existence of phthisis.

Second stage with both lungs diseased.

Thirty-two patients in the second stage had both lungs affected. Among these there were eighteen confirmative results, including thirteen cures, and fourteen negative results, including nine deaths. Thus, in the second stage, when one lung only is affected, the chance of cure is at the very lowest as nine to one, while when both lungs are affected, it is only thirteen to nine.

Third stage.

64. In twenty-seven patients the disease had reached the third stage. Of this number six had only one lung affected, and of these one was cured, and five gave negative results, including two deaths.

In twenty-one patients both lungs were affected, three having cavities in both lungs. In these there were six confirmative results, including three cures, in the three others (including one of the cases where there were two cavities) the improvement continued during the whole time of treatment. The negative results were fifteen, including ten deaths.

Thus, in the third stage, out of sixteen definitive results there were four cures to twelve deaths. The four patients reported as cured were still in perfect health and working hard four years later. This proportion will still appear very large if we compare it with the recorded results obtained by other modes of treatment above reported (34—40).

64 A. Perhaps, however, at first sight, it would seem not to be altogether in accordance with the specific action, which I attribute to the hypophosphites, nor with the conclusions of a paper read by me before the Academy of Sciences. To judge of its true value we must not lose sight of the fact that a patient who recovers in the third stage is not (even when cured) in the same condition as if the disease had not passed the second stage. In the former case there exists for a long period of time an organic lesion, the danger of which is not limited to the mere loss of more or less lung substance, but depends chiefly on the impediment which the lesion offers to the proper fulfilment of the function of the organ in its entirety, and on the consecutive inflammatory accidents to which the patient remains liable for a certain period of time. Thus, three patients after presenting during a considerable time all the signs of a complete arrest of the disease, died of accidental inflammatory attacks; while a fourth, a woman, experienced the same fate after having entirely left off the treatment for more than a year, and after pregnancy and confinement. In the last stage of phthisis the accidental inflammatory complications are much more serious than in the first two stages, and hence it follows that attention to hygienic conditions is much more important at this period than at any other. The number of permanent recoveries in the third stage would have been exactly double if the patients had been in comfortable circumstances.

Third stage in private cases. 64 B. The results obtained in the third stage in my private practice were much more favourable, merely because the patients, belonging to the better classes of society, were able, after their recovery, to secure themselves from the accidents I have just alluded to. So that I still see no reason to qualify the apparently paradoxical proposition, which I enunciated in 1858 (Memoir read to the Academy of Sciences, May 3, 1858. 'Comptes Rendus,' t. xliv. p. 1042), and which indeed had been already stated by Laennec and Andral (15)—viz. that the formation of a cavity is one of the modes of cure in phthisis, and that consequently the disease in the third stage is not, *all other things being equal*, of a more unfavourable prognosis than in the second stage. Unfortunately, as we know too well, when phthisis is left to itself, or treated by other means than the hypophosphites, the softening of existing tubercular matter is nearly always accompanied by a fresh deposit, so that in the great majority of cases the local disease is not simply and purely in the third stage alone, but in the third stage *complicated by the second*, either in the same or in the other lung. Softening tubercles may, therefore, be compared to a full abscess, while a simple cavity is an empty one.

This conclusion thus come to as to the prognosis of the third stage does not, however, rest merely on the number of cures obtained; but also on the rapidity with which the influence of the treatment was felt, and on the fact that several cases in the second stage arrived at recovery only after the formation of a cavity.—See Appendix III.

Recovery possible even with cavity in both lungs.

64 c. Recovery in cases with cavities in both lungs was altogether unknown until I stated, in 1864, that I had sometimes obtained this result. Up to that time I had seen three examples of this. One was a lady who had treated *herself* by the hypophosphites, and who after her recovery came to consult me, because she complained of still suffering from shortness of breath, without any other symptom. She had become very stout and was to all external appearances in perfect health, though the aus-

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determines the prognosis, applies as correctly to acute phthisis as it does to chronic. The acuteness of the disease, that is, the intensity of the general symptoms, has no influence on the efficacy of the treatment, *and this is a result of which no other treatment offers a single example;* for I am not aware that there is a single case of recovery from acute phthisis on record. I had, up to the year 1862, obtained this result in six instances, five of which will be found in my work, 'De la Cause,' &c., Paris, 1864, p. 155, 185, 585, by the use of the hypophosphites, and since then have observed a number of others.

Galloping consumption.

66. It is, however, necessary to call attention to the fact that acute softening and acute tuberculization, are usually confounded under the common name of 'galloping consumption.' They should for the future, be distinguished by the words *acute phthisis, or galloping consumption,* for the one, and acute *softening* for the other. Hitherto this distinction would have been of no importance, but it becomes of the greatest value, if the phosphorized *preparations* are the specific remedy for the former, but not for the latter. This, however, may in most instances be successfully combated by the use of my specific inhalants.

Hereditary predisposition.

67. Of all the conditions which influence the prognosis of phthisis, when not subjected to the phosphorus treatment, none is of a more serious character than the existence of a constitutional or hereditary predisposition.

The following are the facts on this head, noted at the dispensary:—

The parents or relatives of 7 patients (5 children and 2 adults) were actually under treatment for tuberculosis at the dispensary. Of this number there were 6 confirmative results, including 5 cures and 1 death. For these cases there could be no uncertainty. The result of my investigations with regard to the rest was, that in 30 patients there was no hereditary predisposition.

It was doubtful, or not taken note of, in 25 cases; while 24 patients stated that consumption existed in their families. These numbers—31 cases of predisposition in 79 patients—come very close to those of Briquet, who found that out of 99 patients, there was hereditary predisposition in 38. In the 24 cases showing hereditary predisposition, the results of treatment were confirmative in 18, of which 12 recovered, while there were only 6 negative results, of which 5 were deaths; but 3 of these were due to accidental complications. The cases in which there was no predisposition gave 17 negative results to 13 confirmative, 9 cures to 8 deaths; so that if we only reckon the definitive results may stand as follows:

In the cases of *certain* hereditary or consanguineous predisposition, there were 5 recoveries to *one* death.

In the cases of *probable* hereditary or consanguineous predisposition, there were 12 cures to 5 deaths.

Counting the two sets of cases together, we find 17 recoveries to 6 deaths; while in the cases where no predisposition existed, there were only 9 recoveries to 8 deaths.

The cases where the predisposition was not noted, or seemed doubtful, confirm this result. Out of 25 such there were only 11 confirmative results, of which 6 were recoveries, against 14 negative results, 9 of which were deaths.

Specific more efficacious in hereditary cases.

68. So considerable a difference evidently cannot be a mere accident or an error in numbers. We are consequently led to the conclusion that, contrary to all the experience hitherto recorded of phthisis when left to itself or treated by the usual means, *phthisis which is hereditary is more amenable to treatment by the hypophosphites* than that which is not hereditary.

The reason of this.

If we admit that the hypophosphites have a specific action upon the tubercular diathesis without modifying directly the local lesions, it is evident this action will be the more manifest the freer the phthisical condition is from accidental complications. Now, such is evidently the case in hereditary phthisis, where the disease, as is well known, usually shows itself without being ushered in by any serious inflammatory condition. On the other hand, in many if not in most cases of phthisis, where the disease is not hereditary, it is found that it usually follows some more or less acute attack of congestion or inflammation. There can be no stronger argument in proof of the specific action of the hypophosphites.

69. The comparison of the various ages gives a different result from what might be expected, if we take into account the greater rapidity with which phthisis progresses in the young. As stated by Louis (*op. cit.* p. 456), 'It appears very probable, nay, almost certain, that youth, which so clearly favours the development of tubercles, also hastens their progress.' **Age.**

The number of patients observed was not large enough to give any definite results with regard to the various periods of life; but it showed clearly that the prognosis is much more favourable for children than for adults.

70. Thus, ten children gave nine confirmative results, of whom seven recovered, and only one negative case (death). This last patient was in the third stage, and died of pleurisy after having been *quite well* for nearly two years. This great difference between the confirmative and negative numbers cannot evidently be the effect either of a simple coincidence, or of an error in the figures. Neither can the difficulty of diagnosticating phthisis in children with perfect certainty be alleged as an objection, since to invalidate the result we must admit, that out of ten patients, in whom the diagnosis was made with every possible care, a mistake was made nine times, and that no phthisical children came to the dispensary. This is another most important and unexpected fact in the treatment of phthisis by the hypophosphites, which, like the two others already mentioned, viz. local lesion, and hereditary predisposition (61, 67), did not particularly strike my attention until evolved **Children.**

by the use of the numerical method. Since then I have had a large number of children under my care, and may state broadly that recovery in children under adult age, at all stages of the complaint, whenever the amount of sound lung tissue remains sufficient to support life, takes place in nine cases out of ten. I might quote numerous instances of children, where the disease had already reached the third stage, who have recovered, and have been in the enjoyment of sound health for many years.

Complications. 71. I now come to a very important point—that which relates to the influence which the existence or non-existence of complications exerts on the cure of phthisis by the hypophosphites. The complications of consumption are of two kinds; some are secondary or tertiary consequences of the disease itself, and are nearly sure to appear at a certain stage of its development. Such are hæmoptysis, diarrhœa, amenorrhœa, vomiting, fatty degeneration of the liver, disease of the kidneys, &c. Others are distinct diseases co-existing with the principal complaint. Such are accidental intercurrent inflammation of the different parts of the respiratory apparatus, bronchitis, pleurisy, pneumonia, laryngitis. The first kind of complications may be called *consecutive*, the second *accidental*. The latter will be spoken of further on (64 D., 162—168). When called upon to judge of the importance of those of the first class, we have to take into account three different circumstances—their nature, their intensity, and the period of the complaint at which they appear.

Œdema. 72. *Œdema of the extremities*, when not dependent on an accompanying affection of the heart, is always a very serious symptom in relation to phthisis, since it indicates the existence of a considerable mechanical obstacle to the circulation, due either to the extent of the lesion in the lungs, to fatty degeneration of the liver, to disease of the kidneys, or to embolic disease of the veins, and is usually indicative of a speedily fatal termination. In four cases, however, I have seen the patients recover after well-marked œdema. One of them had a cavity in both lungs.

Aphthæ.

73. *Aphthæ*, or *diphtheria*, which are pathognomonic of a general failure of the nutritive function, are a still more fatal symptom than œdema, though even here I have seen a few instances of recovery.

Hæmoptysis.

74. In the prognosis of *hæmoptysis* a distinction should be drawn between the result of a given attack and that which depends on the hæmorrhagic tendency of a patient. The first varies with a number of circumstances which it would be too long to investigate here. The second case, viz. the existence of the hæmorrhagic predisposition, will render the prognosis less favourable than it might otherwise be, for two reasons; first, because the patient may be suddenly cut off by hæmorrhage; and next, because there will be need of greater caution in the use of the hypophosphites (131, 201).

Pyrogallic acid.

75. Since this was first written, in the year 1863, I have found a perfect specific for the arrest of hæmoptysis. This is pyrogallic acid, chemically pure, given either in one-grain pills repeated every hour, or above all, administered as spray in a solution of two grains to the ounce, and repeated as occasion requires from time to time. Since 1863, that is for upwards of ten years, I have only lost two patients by hæmoptysis, while before that period I had the misfortune to lose several every year.

Vomiting.

76. *Vomiting* may depend upon two causes. At the beginning of the disease it is usually produced by the intensity of the cough, and does not modify the prognosis, since, when this is favourable in other respects, the vomiting almost always disappears on the patient's improving, and no necessity exists for any special treatment. When, however, the vomiting depends on the state of the

digestive organs, the prognosis is less favourable, as it must be based not upon the simple existence of the symptom, but upon the whole morbid series, of which it is only one sign.

These vomitings usually produce great weakness, because they directly interfere with nutrition, and have been hitherto looked upon by pathologists of the anatomical school as dependent upon softening of the mucous membrane of the stomach. This is an error which I pointed out many years ago. The softening found on post-mortem examination in cases of this kind is an effect of cadaverous decomposition. The vomiting is almost always proportionate to the violence and frequency of the cough, and disappears as soon as the latter is reduced to its *minimum* by the action of the hypophosphites or by local treatment of the lung by the inhalants. In some few cases, however, vomiting, or rather *nausea*, seems to be connected with renal or uterine complication.

Fever and night sweats.

77. *Hectic fever and nocturnal ephidrosis* are generally a consequence of the purulent resorption which takes place in the lung tissue. If the disease is recent, both symptoms usually disappear by the aid of the hypophosphites alone, because they depend either upon the resorption of tubercular matter, or upon the general debility of the patient. When the disease is more advanced, when the tissues of the lung are deeply disorganized, and purulent secretion is fully established, perhaps by the formation of a pyogenic membrane, this result cannot be obtained, or can only be obtained very slowly by the hypophosphites alone. The inhalants are then indispensable (503).

Diarrhœa.

78. *Diarrhœa* at the beginning or in the course of the disease, and not depending on ulceration of the intestines, nearly always yields either to the action of the specific alone, as is mostly the case in children, or to

appropriate adjuvant remedies. It therefore calls for no modification of the prognosis. Yet, as this is a point which is often very difficult to decide, the prognosis in such instances depends chiefly on the intensity and the persistence of the complication, whatever be its cause, since this always produces a disturbance of nutrition. When diarrhœa is present the prognosis ought, therefore, to be given with great reserve until we are sure of being able to combat it successfully. *Colliquative diarrhœa* is only one of the numerous symptoms of organic lesions involving nearly every part of the body, and is necessarily fatal. I have, however, more than once been called in consultation to a case of phthisis with colliquative diarrhœa and all the concomitant symptoms of an expiring patient, and have been told by the attending physician that he thought it *an excellent opportunity for trying the effect of the hypophosphites.*

Fatty liver.

79. *Fatty degenerescence of the liver*, when it has reached a certain extent, is also an unfavourable symptom, though I think it has not the importance which some pathologists have assigned to it.

Laryngitis.

80. The prognosis of phthisis complicated with *laryngitis* under ordinary treatment, is, as is well known, almost always fatal. Of all the complications of phthisis this is perhaps the most formidable, and tubercular laryngitis has hitherto been looked upon as absolutely incurable. It was observed in ten patients out of the seventy-nine. There were four confirmative results, of which two were cures, and six negative results, including three deaths. In my private practice the results with the hypophosphites alone have been more favourable than this, and since my discovery of the stœchiological inhalants, the unfavourable prognosis of tubercular laryngitis no longer holds good.—See Appendix IV.

Amenorrhœa.

81. *Amenorrhœa*, which shows itself at the beginning of phthisis, not yet under the specific treatment, is usually

not of much importance, as it may then depend on the general condition, and on imperfect hæmatosis. When it appears in the course of the specific treatment, it may be produced by different causes, such as the breaking down of the pre-existing tubercular deposit, or intercurrent inflammation. In such cases it is always a bad sign, though not necessarily fatal.

Results of my latest experience.

82. Since these clinical results were collected, which is now sixteen years ago, I have treated several thousand cases, both in my private practice and at my Public Dispensary, Rue Larrey, Paris, which was kept open for twelve years, until the breaking out of the Franco-German war in 1870. There is no one of the preceding propositions which might not be supported by almost any number of cases in point. But I think such labour would be useless. When once the conditions upon which a fact depends have been scientifically determined, statistics are no longer of any use. I have seen no cause to alter or modify any of the conclusions above stated, nor have any of the facts alleged in opposition to them by my adversaries, invalidated them in the slightest degree; for the simple reason that either the conditions under which these facts were observed, have not been made known, or, when they have been stated, they have only added new proofs in confirmation of my views. This will be seen in Chapters VI. and IX.

Future treatment of complications.

83. The treatment of the complications of phthisis affords a wide field for future improvement. The whole question of the prognosis and special treatment of these complications, both consecutive and accidental, when under the specific treatment, is a matter of very great importance, which will open up a wide and fruitful field for pathological and clinical research, after physicians have once come to recognize the value of the hypophosphites, and the reality of their 'specific' action against the *constitutional* condition, which is the

essential cause of the local disease. The correct determination of the import of each particular aggravation, and the value of different special adjuvant modes of treatment directed against it, will require the collection of a large number of carefully selected cases. This, in the present state of medicine and medical ethics, is hardly to be expected for some years to come. The number of results I as yet possess upon these different points is not sufficient to allow of my drawing any positive conclusion, although with regard to one or two of them, such as diarrhœa and hæmoptysis, I think I am working in the right direction, and at some future period I hope to be able to publish something definite on the subject. Unfortunately, too many practitioners seem to think that the possession of a 'specific' once admitted, all the rest is plain and easy, and that if a given remedy *really be* a 'specific,' the mere administration of it, no matter when or how, *must* bring about a cure, else it has no claim to be called a specific.

Stœchiological inhalants.

84. The above concerning complications was originally published in 1864. Since then I have discovered, as already stated, that pyrogallic acid is a sure means of arresting hæmorrhage from the lungs, and is of almost unfailing efficacy. Diarrhœa, at least in the colliquative stage, I often unfortunately still find obstinate, though at some future period I hope to be able to publish something definite on the subject. All the other symptoms, such as cough and expectoration, &c., which depend upon the local lesion, are evidently influenced by the condition of the lung itself, and this is now, since my discovery of the stœchiological inhalants, as amenable to treatment as any external non-specific wound or ulceration. Many years ago, as just stated, I announced that the discovery of a specific remedy for the tubercular diathesis would lead to improvement in the treatment of the secondary symp-

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toms of the complaint. I have steadily since then kept this object in view, and after thirty years research and chemical and physiological experiment, I feel justified in saying that I have achieved a new conquest in the domain of stœchiological medicine by the discovery of a new series of chemical compounds, which exert as powerful a control over the *local state* of the lungs as the hypophosphites do over the *general condition* of the system which produces phthisis.—See Chapter X.

85. From what precedes we are justified in drawing the following conclusions :—

In the present state of medical science phthisis, when not treated by the hypophosphites, at whatever period of development it may be observed, however early the stage at which it may be taken in hand, must be regarded as almost always fatal.

All the means hitherto used have no certain action except against the accidental complications of the disease; its essential causal conditions remain completely beyond their control, for under the most able and most experienced hands, the number of recoveries is hardly more than one per cent. (33—42).

In the very rare cases where phthisis ends in recovery, it has been hitherto impossible to determine what were the conditions to which this result was due. As the prognosis of the almost certain fatality of phthisis depends solely on the *nature of the disease itself*, it is impossible to determine beforehand, with the least probability, whether any given case will be an exception to the general rule (15, 17, 27 A, 33, 42, 44, 58).

On the other hand, when phthisis is submitted to the specific treatment of the hypophosphites, the prognosis may in the great majority of cases be established with a degree of certainty equal if not superior to that of any other curable disease (59).

It rests upon two series of conditions: the extent of existing pulmonary lesion, and the presence or absence of complications.

When there are no complications the prognosis may be thus stated :—

Phthisis in the first stage always ends in recovery (62).

It also ends in recovery in the second stage, provided one lung only is affected. In this case the proportion of recoveries may be as high as nine-tenths (63).

Hence it ensues that the use of the hypophosphites is followed by recovery in every case where the local lesion has not gone beyond certain limits, and consequently *every patient may be cured, provided the specific treatment be used in time.*

Phthisis in the third stage, when limited to one lung, may also be followed by a cure (64).

When tuberculosis in the second stage exists in both lungs, recovery depends upon two conditions; first, the cessation of the diathesis, which is brought about by the proper use of the hypophosphites; and secondly, upon the possibility of arresting softening, or of compelling it to proceed but slowly, which may usually be obtained by appropriate secondary means, particularly the use of my newly discovered inhalants (83, 84). The favourable conditions in such cases are: when the deposit is only partial in both lungs, or when, if diffused throughout both lungs, the tubercles are disseminated and far apart.

When the disease has reached the third stage and tuberculosis has attacked both lungs, recovery is still possible (64 A, 64 B).

Even when there are cavities in both lungs, recovery has taken place in a few exceptional cases (64 c).

The prognosis of acute phthisis rests on the same principles as that of chronic, but offers more uncertainty on account of the difficulty of ascertaining exactly the extent of the already existing lesion, and also of distinguishing between acute tuberculosis and acute softening (66).

In children the prognosis is much more favourable than in adults, which is altogether contrary to what is observed with any other mode of treatment. In children I have seen recovery take place with the hypophosphites in nine cases out of ten at all stages of the complaint (70).

With the hypophosphites patients who have an hereditary predisposition have more chance of recovery than those who have no predisposition (67).

The prognosis of the consecutive complications of phthisis is variable with regard to laryngitis (80); diarrhœa (78); amenorrhœa (81). It is generally fatal when there is œdema (72); and when there are aphthæ or diphtheria (73).

These conclusions apply to cases where the hypophosphites alone are used, and where the patient has the benefit of only the ordinary means employed against the inflammatory or congestive states of the lungs; when he can use the stœchiological inhalants the prognosis is much more favourable still and may be briefly stated as follows: Whatever amount of lung tissue is not already anatomically disorganized may be preserved and ultimately restored to physiological activity (84).

CHAPTER V.

CHEMISTRY AND PHARMACOLOGY OF THE HYPOPHOSPHITES.

Hypophosphites and phosphates.

86. So little seems to be generally known, even among the medical profession with regard to the chemistry of the hypophosphites, and so little is to be met with on the subject in chemical treatises, that it is indispensable to enter somewhat fully into the subject. One proof, among others, of the generally defective information existing upon this point is, that the *hypophosphites* are constantly being confounded with the *phosphates.*

Now, *phosphoric acid* ($P.O^5$), the electro-negative principle of the phos*phates*, is phosphorus completely saturated with oxygen, and consequently no longer possessing any affinity for that element; *hypophosphorous acid* ($P.O$), the electro-negative principle of the *hypo*phos*phites*, is, on the contrary, phosphorus in nearly the lowest state of oxydation, and consequently possessing almost as much affinity for oxygen as the element phosphorus itself.

None of the chemical reactions of the salts of hypophosphorous acid are the same as those of the phosphates. The two series of compounds are, therefore, no more alike than the diamond and carbonic acid, than sulphur and oil of vitriol, than vinegar and sugar. Their use in, and their effects upon, the animal system, are as dissimilar and as widely separated as their chemical properties.

As will be shown in Chapter VIII., the phosphates in the animal economy are probably either the components of fully-developed and, consequently, *stationary* histological elements, or the result of *retro*gressive metamorphosis; they are, therefore, the *residue* of the molecular processes which constitute the phenomena of life, and are, so to speak, the *ashes* of the vital furnace. These ashes, which constitute what I propose calling the *phosphatic element*, are in part, if not in the main, produced by the oxydation or combustion of another phosphorus compound existing in the system, and which I propose should be distinguished from the former, by calling it the *phosphorized* or the *phosphide element*. This latter, instead of being a residue or a component of fully-grown and, therefore, already decaying, products, is one of the primary principles of all the morphotic or germinal elements; it is, therefore, one of the essential conditions of all *pro*gressive metamorphosis, —perhaps, of all vital action. This broad distinction between these two biological elements—which had, until my researches on the subject, almost entirely escaped the notice of physicians and physiologists—will show at a glance that the views I profess with regard to the nature of tuberculosis and the action of the *hypo*phosph*ites* are very different from the admitted ideas as to the function of the phosph*ates*, to which most persons are continually endeavouring to refer them. In spite of what I have published on the subject for twelve years past, many practitioners still prescribe the phosphates or phosphoric acid, under the idea that they are using my treatment, and occasionally these salts may be found to produce some slight effect from the fact that commercial phosphoric acid almost always contains a certain proportion of oxydizable phosphorus in the form of phosphor*ous* acid (300).—Schmidt's 'Jahrbücher,' Bd. 45, S. 157.

In the course of my researches to discover a remedy for tuberculosis, I finally, as already explained (50—53), thought of starting from the hypothesis that it depended upon the want in the system of the phosph*ide* (that is, of the oxydizable), and not of the phosph*atic* (*i.e.* the fully oxydized) element. Hence I was led to attempt the introduction into the system of some compound of phosphorus combining the two requisites of being assimilable and oxydizable.

On reflection, I found that the oxygen compounds of phosphorus were those which seemed most likely to fulfil these requisites; and among them, my choice was directed by the following considerations:—Phosphorus combines with oxygen to form *four* different compounds—*a*, The oxide of phosphorus, P^3O^2; *b*, Hypophosphorous acid, PO; *c*, Phosphorous acid, PO^3; *d*, Phosphoric acid, PO^5.

The *oxide* is insoluble, therefore (probably), not assimilable, and appears to have less affinity for oxygen than hypophosphorous acid. Phosphor*ous* acid takes up less oxygen than the *hypo*phosphor*ous*, as it already contains two atoms more of that element, and its alkaline salts alone are soluble. Phosphor*ic* acid is not oxydizable. I was, therefore, led to choose *hypophosphorous* acid, as combining in the highest degree the two requisites of being *at the same time assimilable and oxydizable*. From the outset I was induced by various considerations I need not here (52) particularize again to prefer the use of the *hypophosphites* to that of the *free* acid; and subsequent experience has proved the propriety of this choice. This premised, I proceed to the chemical and pharmaceutical history of the hypophosphites.

Before I made the discovery of their therapeutic properties, and their special action against tuberculosis, these salts were applied to no useful purpose, and were only to be found as specimens in the laboratory. At present their employment as medicines has become so extensive, that they are manufactured by the hundredweight.

87. The point of primary importance in the use of the hypophosphites is their *chemical* purity, and unfortu- Their purity indispensable.

nately, like nearly all substances employed in medicine, they are but too often adulterated.

I have met with salts containing carbonate of soda, free soda, and sulphuret of sodium, which had been sold as pure hypophosphites: just as I have in my possession, prescriptions ordering the phosph*ate* of lime, the phosph*ate* of soda, and the hypo*sul*phite of soda, by practitioners who supposed they were using 'Dr. Churchill's treatment.'

Of ten samples of hypophosphites of soda, lime, and potash, obtained from different manufacturers, and submitted to qualitative analysis, I found only three pure. The other seven contained in considerable quantities, either carbonates, phosphates, or free lime.—Memoir read at the meeting of the French Institute, May 31, 1858, 'Comptes Rendus,' tom. xlvi.

To show the difficulty of obtaining pure hypophosphites, and consequently of arriving at satisfactory results, I may give the following passage, which occurred in a letter from a leading physician in one of the largest provincial towns in England, to a patient of mine, who had formerly been under his care. It coincides exactly with the experience of French physicians similarly circumstanced (91). 'I have long (January 1874),' says this gentleman, 'used the hypophosphites; but as to their *ultimate* benefit, I have not had the opportunity of testing it, inasmuch as patients suffering from a chronic ailment, rarely, in this place, stay long enough under the care of *one* medical man, to enable him thoroughly to test the effect of any medicine. I also soon found, that unless the hypophosphites were tested, they could not be relied upon on account of their *impurity*. In this town especially, where the drug system is so much a trade, I do not suppose there are more than half a dozen druggists who could be relied upon.'

88. As far back as 1858 Heywaerts and Francqui published a paper on this subject ('Journal de Médecine,' Brussels, January 1858, p. 85), in which they said, 'We

have frequently met with adulterated samples of hypophosphite of soda in commerce. Some contained carbonate of soda, others free soda. In some instances we have even found sulphuret of sodium and carbonate of lime. The first samples of hypophosphite of soda that came under our cognizance, contained a large quantity of sulphuret, so much so, indeed, that they looked quite yellow, and gave out a decided smell of hydro-sulphuric acid (rotten eggs) when exposed to the atmosphere.'

Della Sudda.

89. The following is taken from a paper published by M. Della Sudda, Professor of Chemistry at the Imperial School of Medicine at Constantinople: 'The price of the hypophosphites was rather high at first, and they were, consequently, classed among dear medicines: great was our surprise, therefore, to see at what low prices they were retailed; but the enigma was solved when we came to analyse them. One sample of these pretended hypophosphites of soda presented the following characteristics: crystals in rhomboidal prisms, efflorescent on the surface, of a urinous taste, not igniting by heat, but changing, after prolonged calcination, into a pyrophosphate, with which the nitrate of silver gave a bright yellow precipitate soluble in ammonia. It was easy to see, without further analysis, that the substance under examination was the common commercial phosphate of soda. In another instance, we found in some of these powders basic phosphate of lime (calcined bones) substituted for the hypophosphite of the same base. Latterly, we examined a salt crystallized in rhomboidal prisms, terminated at each extremity by an oblique surface, colourless, inodorous, very soluble in water. The solution treated with sulphuric acid produced a disengagement of sulphurous acid, and a deposit of sulphur. This salt, though sold for hypophosphite of soda, was nothing but hypo*sulph*ite of soda. The substitution is certainly ingenious, for instead of the syllables

phosphi, we have *sulphi*, a very trifling difference, no doubt, for some persons, modifying neither the composition of the salt nor its therapeutic virtues. These adulterations are, we should think, still more detrimental to the success of therapeutic experiments than the presence of lime, alkaline salts, or phosphates, pointed out by Dr. Churchill' (87).—Bouchardat's 'Annuaire de Thérapeutique,' 1859, p. 40.

Janssen. 90. Janssen found that the commercial hypophosphite of lime, as sold by the trade, contains phosphite, phosphate, or carbonate of lime; that it is occasionally adulterated with chloride of sodium, sulphate of lime, carbonate of magnesia, and oxide of zinc.—'Répertoire de Chimie,' October, 1861.

Parigot. 91. Dr. Parigot, Professor at the University of Brussels, observes, 'that when the hypophosphites were first introduced by Dr. Churchill, all the samples of hypophosphite of lime were equally good and active wherever procured, because, at that time, there was no great demand for it; but since it has come into very general use, manufacturers have been less scrupulous in preparing it' (87).

My own experiments. 92. From what precedes, it is evident that the manner of preparing the hypophosphites is not a matter of indifference, as some have pretended. What is most singular is, that one of the supporters of this line of argument, M. Berthé, showed by the details he himself gave, that the hypophosphites, prepared by him, and used in Vigla's experiments, were impure, and contained an excess of alkaline carbonate, which, as I showed at the time, fully accounted for Vigla's ill success.—'Moniteur des Hôpitaux,' April 3, 1858.

When I stated sixteen years ago that the non-success of some practitioners was owing to the impurity of the salts they had employed, instead of advancing, as was pretended, a futile and unfounded objection, I only expressed the conclusion to which I had been led by experimental investigation. I had found by repeated clinical experiments that when a certain proportion of alkaline carbonate was added to the pure hypophosphites, the physiological and therapeutical effects were manifested but slowly and incompletely, or failed altogether.

Clinical facts.

93. Nearly all the physicians who have prescribed the hypophosphites with success have pointed out the absolute necessity of employing them perfectly pure. Among others, Drs. Maestre de San Juan, Reinvillier, Galvez and Leriverend and Thorowgood.—See Chapter VI., and cases 'reported from these observers' in Appendix III.

Chemical characters of the hypophosphites.

94. The hypophosphites are, for the most part, crystallizable. In these salts, one equivalent of acid is combined with one equivalent of base. All contain water, of which a part is only the water of crystallization, and is expelled at boiling heat, whereas the other part cannot be eliminated without producing the decomposition of the salt.—See Gmelin's 'Handbook of Chemistry,' printed for the Cavendish Society, London, 1849, Vol. II. p. 114; 'Handwörterbuch der Chemie,' von Liebig, Pozzendorf und Wöhler, Band VI. p. 304; Pelouze et Frémy, 'Chimie générale;' Janssen, 'Recherches sur l'Hypophosphite calcique,' in 'Répertoire de Chimie' for October, 1861.

Some of the following reactions are from my own experiments.

According to H. Rose, the proportion of essential water in the hypophosphites is three equivalents for two equivalents of salt, so that the formula is

$$_2PO + {}_3HO.$$

According to Wurtz, they contain, in a dry state, only two equivalents of water, so that his formula for hypophosphorous acid is

$$PH^2O^3.$$

According to this view, it would result from the combination of three equivalents of oxygen with the liquid phosphuretted hydrogen ($\mathrm{P\,H^2}$), discovered by Paul Thenard. It might, therefore, be regarded as phosphoric acid, in which two equivalents of oxygen are replaced by two equivalents of hydrogen.

$$\mathrm{P\,O^5 + H^2 = P\,H^2\,O^3 + O^2}.$$

When heated, the hypophosphites are transformed, according to Dulong and H. Rose, by the decomposition of their essential water, into phosphuretted hydrogen gas, and an acid phosphate, which remains, according to the equation,

$${}_2(\mathrm{Ca\,O, P\,O}) + {}_3\mathrm{H\,O} = {}_2\mathrm{Ca\,O, P\,O^5} + \mathrm{P\,H^3}.$$

A part of the phosphuretted hydrogen is decomposed into hydrogen and phosphorus, and the quantity thus decomposed increases with the degree of heat. When the salt is heated violently and rapidly, it is, therefore, greater than when it is heated gradually. For the same reason it increases towards the end of the operation. The residue resulting from the combustion of the hypophosphites often presents a red tint, from the presence of a certain quantity of oxide of phosphorus.

Instability of the hypophosphites.

95. The hypophosphites when perfectly dry are not acted upon by the air, but as they easily attract moisture from the atmosphere, they then combine with its oxygen, and are first transformed into a phosphite,

$$\mathrm{K\,O, P\,O} + {}_2\mathrm{O} = \mathrm{K\,O, P\,O^3};$$

and afterwards into a phosphate,

$$\mathrm{K\,O, P\,O^3} + {}_2\mathrm{H\,O} = \mathrm{K\,O, P\,O^5}.$$

This oxydation takes place more rapidly if aided by heat, and especially by boiling.

Hypophosphites in the solid state unserviceable.

96. This is the reason why no reliance can be placed upon the hypophosphites, as therapeutical agents, when

kept for any length of time in the state of salts, and still less in solution. In my preparations, made by Swann, the alkaline salts are always in the form of syrups, made from the recently prepared salt, chemically pure.

When a perfectly neutral hypophosphite is boiled in a closed vessel, it undergoes no alteration; but if it contains an excess of alkaline base, it decomposes water, and is transformed first into a phosphite, and afterwards into a phosphate:

$$(KO, PO) + {}_2KO + {}_4HO = {}_2(KO, PO^3) + {}_4H + KO$$
$${}_2(KO, PO^3) + KO + {}_9HO = {}_3(KO, PO^5) + {}_9H.$$

This remarkable difference between the behaviour with water of the pure hypophosphites and hypophosphites with an excess of base, affords a clue to the difference pointed between the physiological action of the neutral, that is the pure salts and that of the salts mixed with an alkaline carbonate, or an excess of base (92).

When a patient is said to have been taking the hypophosphites for a long time without any effect, either good or bad, we may conclude, without much fear of mistake, that he has been using an impure salt, or no hypophosphite at all.

Reactions of the hypophosphites.

97. All the hypophosphites are soluble in water, several are also soluble in alcohol; the majority are deliquescent in the air. They are not precipitated by the salts of baryta, or strontia, nor by lime water.

Their most important chemical property is the eagerness they show for combining with oxygen which differs only in intensity from that shown by phosphorus itself. At a higher or lower temperature they reduce most of the metallic salts either to the state of a metal or of a metallic phosphide, or of an inferior oxide, by taking from the base either a part or the whole of its oxygen.

In this manner they precipitate the metal from the chloride of gold.

With nitrate of silver, they give a white precipitate, which immediately turns brown, and is converted into metallic silver.

Mixed with hydrochloric acid and a solution of chloride of mercury in excess, they give a precipitate of calomel. Where there is no excess of the mercurial salt, the mercury is precipitated in a metallic state.

The salts of copper are also reduced by the hypophosphites after prolonged boiling.

A solution of permanganate of potash is discoloured almost instantaneously in the cold by a hypophosphite. The same result occurs with the sulphate of manganese, The phosphites and organic matters, such as sugar, it is true, also produce the same reaction, but more slowly.

The bichromate of potash is reduced (when heated) with precipitation of green oxide of chrome.

In the course of researches we made together on the phosphorus contained in the animal system, Emile Rousseau found that the double chloride of palladium and sodium, acidulated with hydrochloric acid, gives, by boiling with the hypophosphites, an abundant black precipitate. Organic substances (such as sugar, gelatine, starch, albumen, urea) do not operate any such decomposition when the liquids are acid, so that this reaction affords an extremely sensitive means for discovering minute quantities of hypophosphite in organic matters. By this means we have ascertained that traces of the hypophosphites may be found in the urine several days after they have been taken into the system.

The affinity of the hypophosphites for oxygen is so great, that in some cases the reaction takes place with explosion. Detonating powders may be thus made with a mixture of hypophosphite of lime and chlorate or nitrate of potash.

Chemical matches, which take fire by friction, may be made with a mixture of hypophosphite of lime, sulphur, and chlorate of potash.

The oxydation of the hypophosphites is also attended with explosion in the following cases :

When the hypophosphite of soda is heated with alcohol and sulphuric acid. The latter is then reduced to the state of sulphurous acid, or even of sulphur.

When hypophosphite of potash is evaporated to dryness with nitric acid.

Fuming nitric acid produces the ignition of the hypophosphite of lime.

Difference between the hypophosphites and phosphates.

98. Not one of these very remarkable reactions is produced by any of the phosph*ates*, so that the *hypo*phosph*ites* differ as completely from the phosphates as a piece of wood or of coal does from a heap of ashes, and for the same reason. The hypophosphites are highly combustible ; the phosphates are completely oxydized or burnt already. A little hypophosphite heated in a spoon over a candle takes fire and burns with a bright flame ; a similar quantity of a phosphate only melts and then dries up. The phosphates being completely saturated with oxygen, have *no* affinity for that element, and, consequently, *no power of reduction*, or of oxydation. Thus the phosphates give with the nitrate of silver, a yellow precipitate of phosphate of silver, whereas, as we have seen, the hypophosphites precipitate metallic silver.

The hypophosphites differ from the phosphites, inasmuch as these being all insoluble, except the alkaline salts, precipitate with strontia, baryta, and lime. The phosphites have, however, like the hypophosphites, a great affinity for oxygen, and a considerable power of reduction, although inferior to that of the hypophosphites, as instanced by their action upon the salts of chrome and manganese. Their action on the system is the same, but is less strongly marked, as they already contain three atoms of oxygen (PO^3) instead of one contained in the hypophosphites (PO). This was the reason why I was led originally to give the preference to the hypophosphites, independently of the want of solubility of the phosphite of lime.

Errors on this point.

99. Whoever weighs the preceding facts, and reflects that the hypophosphites are bodies having so strong an affinity for oxygen that they abstract it from almost all other compounds, and that, in the presence of air, they activate the oxydization of organic matters almost as much as phosphorus itself, will wonder how any physician could have supposed, and still more have maintained, that the hypophosphites, even in large doses, have no action on the animal economy.

To hold such an opinion a man must be equally ignorant of chemistry and of physiology.

Whenever an experimenter has asserted that the hypophosphites produced no effect upon the patient, either good or bad, however large the dose, and however long they may have been used, there can be no doubt whatever, that the reason of this lay in the fact that the patient was taking no hypophosphite at all, or else that it was so impure as to be practically inert.

Different hypophosphites.

100. I have investigated experimentally the action of a great number of hypophosphites, particularly those of soda, lime, potash, ammonia, quinine, alumina, manganese, magnesia, and iron; I have also made a few experiments with those of zinc, bismuth, strontia, and baryta. I found that in the treatment of phthisis the hypophosphites of lime, soda, and quinine should alone be used.

Hypophosphites of potash and ammonia.

101. The administration of the hypophosphites of potash and ammonia, usually produces an increase of expectoration, and symptoms indicating more active disintegration of the tubercular deposit. These phenomena are in accordance with the facts already known respecting the eliminative action of these two bases. In

some exceptional cases, however, I find these salts very useful for promoting the resolution of chronic inflammatory exudations, either in non-tuberculous cases, or when the tubercular condition may be regarded rather as a secondary complication than as the principal disease. This has since been confirmed by other observers, particularly by Dr. Thorowgood, two of whose cases bearing on this point will be found in Appendix III.

Chronic bronchitis and asthma.

In the first edition of my work on Consumption, I mentioned a case of asthma of many years standing, dependent upon chronic bronchitis, which was successfully treated by the hypophosphite of potash. I have since then collected a large number of similar cases.

The hypophosphite of ammonia appears to possess very nearly the same physiological action as the potash salt; but it is also endowed with a special stimulating effect on the secretion of the liver. I have found it useful in the same cases as the hypophosphite of potash. I have also prescribed it with great advantage in certain cases of hepatic derangement, either singly or combined with the hypophosphite of manganese.

The salts of potash and ammonia are possessed of a special eliminative action, which was pointed out by me in my earliest publications as far back as seventeen years ago ('De la Cause immédiate de la Phthisie,' Paris, 1857, p. 225). This explains why some practitioners, such as Taylor, by the injudicious use of them in consumption, have seen the disease all the more rapidly run its course to a fatal termination ('Lancet,' November 20, 1861, p. 518). For the same reason, most of the uselessly complex formulæ published by Parrish of Philadelphia ('Practical Pharmacy,' Philadelphia, 1859), containing a jumble of hypophosphites of different bases, are evidently likely to do at least as much harm as good. The too prevalent idea that phthisis *if curable by the hypophosphites* is to be cured by *any* of these salts given in *any* dose or at *any* time, shows the low state of medicine as compared with that of the really exact sciences.

My pectoral tablets of hypophosphite of ammonia.

102. Since my earlier experiments I have found the hypophosphite of ammonia to be endowed with very peculiar activity as an expectorant. As a laryngeal and faucial stimulant, it is far superior to the other salts of that base hitherto in use, such as the hydro-chlorate and carbonate. Swann, of Paris, has prepared from my indications *pectoral tablets*, with the hypophosphite of ammonia as a base, which are of very great efficacy in those transient states of the mucous respiratory membrane, commonly called coughs and colds.

Coughs and colds.

Hypophosphite of magnesia.

103. A few experiments with the hypophosphite of magnesia have not given results of sufficient importance for me to do more than merely mention them. This salt appears to have an analogous action to those of potash and ammonia.

Hypophosphites of soda and lime.

104. Extended experience has now shown me that *in the treatment of tuberculosis* the practitioner should confine himself to the use of those of lime and soda and quinine. The effects produced by these two salts, when properly administered in phthisis, have such a character of constancy, that I have seldom thought myself justified in intermitting them, or supplying their place by any other. Their therapeutical action is very similar: but the soda salt is rather the less active; the hypophosphite of lime appears also to have a more direct effect on the expectoration, which it sometimes diminishes somewhat too rapidly, thereby causing an increase of cough. In that case it should be replaced by the salt of soda. The lime salt should usually be preferred when there is diarrhœa, as also for children and pregnant women.

Hypophosphite of alumina.

105. I sometimes use the hypophosphite of *alumina* with marked benefit against diarrhœa, and the *purulent* expectoration of consumption.

Hypo-

106. The hypophosphite of baryta, if I may draw a

conclusion from a small number of experiments, seems not to have the same powerful or deleterious action observed in the use of other soluble salts of the same base, such, for instance, as the chloride. I have prescribed as much as ten grains daily for several successive days without any toxical effects. The cases treated by the baryta salt were *not* cases of phthisis. **phosphite of baryta.**

107. I have found the hypophosphite of quinine useful in the *incipient* diarrhœa of phthisis, in that of young children, and occasionally to modify the nature of the expectoration. It has, however, less activity than the other hypophosphites, which is easily accounted for by the small proportion of acid it contains (112 L). It is thus useful when the other salts may be found too active. **Hypophosphite of quinine.**

The hypophosphite of quinine is a new compound which was first prepared for me upon my indications in Paris as far back as the year 1856 (See 'De la Cause immédiate,' &c., Paris, 1857, p. 228). Dr. Lawrence Smith, of Louisville, U.S.A. (Parrish's 'Pharmacy,' p. 502), and Messrs. Savory and Moore, are therefore equally mistaken in claiming to have originated this compound, or to have been the first to introduce it into medical use. As originated by me, and as prepared by Swann, of 12 Rue Castiglione, Paris, this salt is an amorphous substance of honey-like colour, very soluble and deliquescent, of an intensely bitter taste. It has the consistence of soft wax, takes fire when heated, and burns like rosin. It is evidently, therefore, a different compound altogether from that met with in the trade, under the same name. This latter is obtained by double decomposition between hypophosphite of lime or baryta and sulphate of quinine. It is in white needles, and is most frequently an impure product, consisting of a mixture of hypophosphite of quinine, sulphate of quinine, and sulphate of lime or baryta. The hypophosphite of quinine, as prepared by Swann, is the only one which is fit for medical use.

Hypophosphorous acid.

Dangerous.

108. I have employed *hypophosphorous acid* experimentally, and I have established beyond doubt, that, in the free state, it has the same action as when combined with soda or lime; but it acts with dangerous energy, and produces more rapidly the series of phenomena which I call *pathogenic* (128). This identity between the action of the free acid and that which it has when combined with soda or lime, proves that the therapeutic effects in the latter case depend upon the acid and not on the base, as supposed by some therapeutists, such as Gueneau de Mussy and Taylor.—See 'De la Cause immédiate de la Phthisie,' &c., Paris, 1864, pp. 352, 677.

Hypophosphite of iron.

109. In the first edition of my work on Consumption, I stated that the action of the hypophosphite of iron should only be tried with great caution in cases of consumption, as in several for which I had prescribed ferruginous preparations simultaneously with the hypophosphites, their exhibition appeared to be followed by hæmoptysis, or hæmorrhage in some shape or other. I also remarked that the association of iron with hypophosphorous acid appeared to me unlikely to prove of much utility as an anti-tuberculous medicine, because a sufficient quantity of iron to saturate the ordinary dose of acid would probably be dangerous, and could certainly not be given continuously without accident. Subsequent experience has since fully confirmed these views. Not only was hæmorrhage produced in almost every instance in which I used the hypophosphite of iron, but in patients who have been previously taking ferruginous medicines, it will be found that it is very difficult, at first, to keep the effects of the hypophosphites within the limits of what I shall show (114—118) is their proper, or their *physiogenic* action. For this reason, I have almost entirely given up the use of the hypophosphite of iron in phthisis, except in some few exceptional cases. But in

Anæmia

cases of chlorosis and anæmia, as also of general debility,

and chlorosis.

in female diseases, and in certain nervous disturbances, they will be found far superior to all other ferruginous compounds.

Hypophosphite of manganese.

110. The hypophosphite of manganese acts in the same manner, but with much less energy. It has a special excitory action upon the biliary secretion, and I have found it peculiarly useful, either alone or in conjunction with the hypophosphite of quinine, in hepatic derangement with deficient biliary secretion, subsequent upon prolonged residence in tropical climates, as also in cases of anæmia, and general debility, depending upon the same cause.

Field for future research.

111. The experimental determination of the different modes of action of the numerous compounds formed by hypophosphorous acid, and the various bases, offers a wide field of research, which, according to the usual rate of medical advancement, it will no doubt take many years to explore.

Pharmaceutical confusion.

My treatment of consumption resting upon the principle that the tubercular diathesis depends upon the want or the undue waste of some *phosphorus* compound normally existing in the system and containing that element in an *oxydizable* condition (52, 53), any preparation of phosphorus, which is at once *assimilable* and *oxydizable*, *may* act specifically against the disease; but *how far* and *how* it will lead to a curative result can only be ascertained by direct clinical research. Whether any compounds will hereafter be found to possess greater powers, in this respect, than the hypophosphites of lime and soda, it is impossible to say in the present state of our knowledge of pathology and chemistry; but of this I feel assured, that none will yield results of a better defined and more positive character than may already be obtained by the employment of these salts, when properly used, as will be shown in the next chapter. These effects are, to my mind, so clearly and scientifically characterized, that I have felt precluded, to a great extent, from further experiment with the other compounds of phosphorus in the treatment of consumption. However desirable it might be that physicians in general should be at the trouble of making themselves masters of what has already been effected in this direction, rather than waste their time and jeopardize the safety of their patients by aimless efforts at novelty, it is too much to expect, in the present state of medicine and pharmacy, that any opinion of mine will have much influence in the matter. Pharmaceutical chemists will go on proposing new compounds of phosphorus, as a commercial speculation, until we have got as many of them as we have preparations of iron, and probably with as little real utility.

This view was first expressed ten years ago, and since then this prediction has been fully realized. Almost every possible compound of phosphorus is now advertised in every possible shape. Now all these can only act either as oxydizable compounds, or as compounds already fully oxydized. As will be shown in the next chapter, these last, the fully oxydized compounds or phosphates, are, in a medical point of view, of very little use, even if they be of any use at all. Of the oxydizable compounds the only ones which can act medicinally are phosphorus itself, its oxides, certain phosphides, the hypophosphites, the phosphites, and their free acids, the hypophosphorous, and the phosphorous. These last, as has been stated, have been experimented upon by me and were found too uncertain, too suddenly active, not to be looked upon as dangerous (108, 299, 300, 301). Of the hypophosphites the only ones which should ever be prescribed in phthisis, except under certain rare and peculiar circumstances, are those of lime and soda, and occasionally of quinine (104, 112 L).

Its dangers. 112. The numerous phosphorus compounds which are now sold as drugs or patent medicines, either under that name or in disguise under some other, may sometimes be found at the outset to improve the condition of the patient, and to act even more rapidly in large doses than the pure hypophosphites, when these are prudently and scientifically administered. But as will be shown in the next chapter, these flattering appearances will almost always lead to the disturbances which I class under the name of *pathogenic* (128), and in cases of phthisis, hasten a fatal termination.

Independently of the confusion between the phosphates and the hypophosphites kept up in the public mind by the unfortunate similarity of names, and by the doings of ignorant or interested persons, another source of error arises from the fact that commercial phosphoric acid, and the phosphates prepared from it, often contain a large proportion of phosphor*ous* acid; so that, when the patient is supposed to be only taking a phosph*a*te, that is a completely oxydized compound of phosphorus, he is in reality taking a phosph*i*te, that is, an oxydizable one.—Casper's 'Medicinische Wochenscrift,' 1844, p. 455. I can therefore hardly hope that my warning will be much heeded; it will be overpowered by the din of prejudice, avarice, and ignorance.

My hypophosphites.

Against one thing, however, I protest, as I have been doing for seventeen years past. A number of persons, both in Europe and America, have usurped the use of my name in connection with their preparations of the hypophosphites. Not only has this been done without any authority from me, but such of these compounds as have come under my notice are totally unfit for medical use. I long felt reluctant to recommend the preparations of any particular chemist, but the abuse of my name had been carried so far that I came to the conclusion twelve years ago that I owed it, as a matter of justice both to myself and to others, to allow Mr. Swann, of 12, Rue Castiglione, Paris, the exclusive use of my name.

By this means all who wish to use the hypophosphites, and to follow out the rules which I have laid down as necessary for their success in the treatment of consumption, are enabled to make sure of the first and indispensable condition—the perfect purity of the remedies themselves, by using none but *my* hypophosphites, prepared by Swann, and which bear my signature as a guarantee.

Reason of the superior efficacy of the hypophosphites.

112 A. The reason of the superior efficacy of the hypophosphites to all other oxydizable compounds of phosphorus will be apparent from what follows.

I have calculated the proportion of phosphorus contained in each of the different hypophosphites used in medicine. In all these compounds the phosphorus of the hypophosphorous acid is already combined with one atom of oxygen, but as it requires five to raise it to its highest degree of oxydation, and satisfy its affinity for that gas, five atoms of PO are equal to one of phosphoric acid, and four of phosphorus $5PO = PO^5 + 4P$. Hence it follows that the oxydizability and consequently the comburating power (339) of hypophosphorous acid is only one-fifth less than that of phosphorus itself.

112 B. The reader must not, however, forget that the action of the saline compounds upon living beings depends not only upon the acid, but also upon the base, and it would be a great mistake to suppose, for instance, that one grain of hypophosphite of ferrous oxide, which is equivalent in oxydating requirement to less than $\frac{1}{6}$ of a grain of phosphorus, will act less energetically as a medicine than one grain of hypophosphite of lime, which is equivalent to double the quantity ($\frac{1}{3}$ of a grain) of phosphorus (109).

112 C. The consequence, which is most strikingly apparent from this study of the chemical proportions of which these salts are composed, is that as remedial agents they must evidently possess far greater potency than any

preparation whatever of simple phosphorus. This latter can only be given in doses of a fraction of a grain, and even then its continued use is followed by dangerous if not fatal effects (474). The hypophosphites, on the other hand, may be given in large doses continuously without any other result than *over stimulation* of the system, and specially of the hæmatogenesis or blood producing function.

112 D. A dose of one grain of phosphorus in whatever menstruum (be it oil, ether, fat, resin, or anything else) is a dangerous quantity, and if it should be taken once or twice with impunity, would, if repeated, kill the patient in a very few days. Ten grains of hypophosphite of lime or soda, which are equivalent to respectively *three* and *four* grains of phosphorus, may be taken not only without danger, but with evident advantage (where there is no organic lesion), for a considerable time, and doses of 45 grains of *pure* hypophosphite of soda, prepared by myself, equivalent to *eighteen* grains of phosphorus, have been given by me without any deleterious effects. Some experimenters, as Dr. Quain, have given as much as 180 grains (equal to 72 grains of phosphorus) in 24 hours (463), but it is possible, or even likely, that in this case the salt was not pure.

The discovery of the physiological and medicinal action of the hypophosphites has thus placed in the hands of the scientific physician an instrument of unequalled potency by making him, *within the limits of biological possibilities and anatomical conditions*, master of what is most probably the initiating or inciting principle of all vital phenomena (331).

112 E. Hypophosphite of lime, CaO, 2HO, PO, contains 46·13 per cent. of hypophosphorous acid, consequently 39·3 per cent. of acid. The capacity for oxygen of 100 parts of this salt is equal to that of 31·44 parts of phosphorus. Ten grains of hypophosphite of lime have

therefore more than the same oxydating energy, and consequently the same remedial power, as three grains of phosphorus. One grain of hypophosphite of lime may be looked upon as equal to $\frac{1}{3}$ of a grain of phosphorus.

112 F. Hypophosphite of sodium, NaO, PO, contains 55·80 per cent. of hypophosphorous acid, consequently 44 per cent. of phosphorus. Ten grains of this salt are therefore equal in capacity for oxygen, and in remedial power, to nearly four and a half grains of pure phosphorus. One grain of salt may be considered as practically equivalent to half a grain of phosphorus.

112 G. Hypophosphite of potash, KO (PO, 2HO), contains very nearly 30 per cent. of phosphorus. The comburent and medicinal action of 10 grains of it is therefore equal to that of 2·4 grains, practically $2\frac{1}{2}$ grains, of pure phosphorus.

112 H. Hypophosphite of ammonium, NH^4O (PO, 2HO), contains 38·5 per cent. of phosphorus, consequently the quantity of oxygen required to saturate 100 grains of this salt is the same as that which would be required by nearly 31 grains of phosphorus. Ten grains of hypophosphite of ammonia may therefore be looked upon as equivalent to 3 grains of pure phosphorus.

112 I. Hypophosphite of baryta, BaO (PO, 2HO) + HO, contains 21·8 per cent. of phosphorus; 10 grains are therefore equivalent to 1·6 of a grain, practically $1\frac{1}{2}$ grain of phosphorus.

112 J. Hypophosphite of iron (ferrous oxide), FeO (PO, 2HO) + 6HO, contains 20 per cent. of phosphorus, and 10 grains of it may be looked upon as equivalent to rather more than $1\frac{1}{2}$ grain (1·6) of phosphorus. One grain is equivalent to $\frac{1}{6}$ of a grain of phosphorus (112 B).

112 K. Hypophosphite of manganese, MnO (PO, 2HO) + HO, would contain very nearly the same per centage of metal as the preceding if the salts be considered in their

dry state. But as the manganese salt only contains 1 atom of water of crystallization instead of 6, as is the case with the ferrous salt, 10 grains of hypophosphite of manganese are equivalent to rather more than 2 grains of phosphorus. One grain is equal to nearly $\frac{1}{4}$ of a grain of phosphorus.

112 L. Hypophosphite of quinine, $C^{40}N^2H^{24}O^4POHO + 2HO$, contains 10 per cent. of hypophosphorous acid, of which 7·94 is phosphorus, so that practically we may say that hypophosphite of quinine contains 8 per cent. of phosphorus, and that its oxydizable power is equal to that of 6·36 of phosphorus. Ten grains of hypophosphite of quinine will require as much oxygen for their saturation as 0·636, or rather more than half a grain of phosphorus. One grain of hypophosphite of quinine is equal to rather more than *one-twentieth* of a grain of phosphorus.

The quinine salt is therefore the one which contains the smallest proportion of the active phosphide element. This is one of the reasons why it will frequently be found useful in cases of intercurrent inflammation and other complications when the more powerful combinations are found to be too active and stimulating, and why it should often be preferred, at least in the beginning of the treatment, for certain cases, such as very advanced phthisis, where the action is required to be small and slow.

CHAPTER VI.

MODE OF ACTION OF THE HYPOPHOSPHITES, AND RULES OF TREATMENT.

Imperfection of therapeutical science.

113. THE mode of action of remedies is as yet but very imperfectly understood. It is assumed that their curative action in disease is dependent upon the modifications they produce in the system during the healthy state, and therapeutists have long recognized that the true study of the therapeutical action of a substance ought always to be preceded by that of its physiological effects. Beyond this point very little progress has been made. The action of some even of the best known and most valuable remedies is lost under a mass of confused and uncertain facts. Quinine, for instance—which is, so to speak, the ideal specific for all fevers of an intermittent character, and, generally for all the diseases produced by tropical malaria—is hardly ever given in the form, the dose, or at the time best fitted to show its wonderful efficacy. Physicians go on prescribing the sulphate of this alkaloid for no other reason than because that is the preparation which the druggist usually holds. Yet to any one who has had a sufficient experience of tropical practice, as is the case with myself, nothing can be more evident than that this is a most detestable preparation. When used during or to ward off an attack of intermittent or remittent fever, it is no doubt efficacious, but as an *antifebrile prophylactic* for daily use, it is one of the worst preparations that could be selected. Its continued administration, particularly in the tropics, invariably pro-

duces gastric irritation, and sometimes actually brings on enteritis or dysentery. The only preparation of quinine which should be prescribed under such circumstances is the *amorphous quinine* or *quinoidine*, and there can be no doubt that had this therapeutical fact been known to those who had the medical superintendence of the late Ashantee expedition many lives might have been saved. The cinchona or Jesuit's bark has now been known for two centuries. Chemistry has discovered and separated its different constituents, but medicine is as yet ignorant of the true rules which ought to guide us in the use of them. Such, it may be said, is equally the case with almost every one of the drugs which go to make up the long and oppressive list of our *materia medica*. The reader who feels any curiosity upon the general bearings of this subject may refer to what I have written thereon in my French work, 'De la Cause immédiate de la Phthisie,' etc., Paris, 1864, pp. 589 *et seq.*

Physiogenic and pathogenic action of the hypophosphites.

114. I have endeavoured not to leave a hiatus of this kind in the therapeutical history of the hypophosphites, and have been led to distinguish the phenomena produced by their action upon the system into two classes, which I shall call *physiogenic* and *pathogenic*, a distinction which will be found of general application to all therapeutical phenomena.

Physiogenic action consists in the increase or decrease of some one or several of the normal functions, without their exceeding their physiological limit, and consequently without the production of morbid phenomena. The other class, the *pathogenic*, includes all phenomena produced by the agent, different from those which exist in the normal state. As long as there is only increase or decrease of function, the action of the remedy is simply *physiogenic*. As soon as there is any manifestation of a morbid phenomenon, the action must be looked upon as *pathogenic*. For instance, mercury in small and proper alterative doses, produces only physiogenic symptoms. If the dose be increased, or its action prolonged beyond a certain time, its eliminative effect upon the intestine, or upon the mucous membrane of the mouth and the salivary glands, warns the most inattentive observer that it has entered into the sphere of pathogenic activity. Prussic acid given in physiogenic doses has a simply sedative action; if the dose be increased, it produces the pathogenic symptoms of sickness, difficulty of breathing, headache, vertigo, loss of sight, etc., which, if too long continued, are finally followed by death.

Contra-stimulism and homeopathy.

115. The distinction between these two orders of phenomena, which was first pointed out by me in 1863 ('De la Cause immédiate de la Phthisie,' etc., Paris, 1864, p. 605), corresponds on the one hand, the physiogenic action, to the doctrine of stimulism and contra-stimulism of the Brownian and Rasorian School; on the other, the pathogenic action, to the homeopathic doctrine of Hahnemann. As taught by the Rasorians, every modification of the system can only consist in an increase or a decrease of its functions; but this distinction is only accurate, and can only serve as a therapeutical or pathological criterion, as long as the change does not exceed the limits of normal variation. In like manner, as taught by the Hahnemannian school, the pathogenic effects produced by drugs are true diseases, as had been recognized before the time of Hahnemann. But it in no wise follows from thence, that a drug has no curative action unless its pathogenic effects resemble the symptoms of the disease. We have hardly, however, the right to cast our stone at the homeopathists. How many of the public, and alas, how many physicians, think the efficacy of a drug is to be measured by the number and the intensity of its pathogenic effects!

Scale of therapeutical effects.

116. If properly studied, it will be found that these two series of phenomena offer a regular scale of modifica-

tions, to which all the effects resulting from the action of any given substance upon the animal system may be referred. When they have once been ascertained for any given agent; when the order of succession of the variations in each series has been determined by observation; when the relations existing between each of these degrees of action and the corresponding medicinal effect has been settled, we shall be in possession of a fixed standard, which will enable us to lay down the rules which ought to be followed in order to obtain any given result. If, for instance, we want to obtain the effect of quieting the heart by the use of digitalis, we must not exceed the limit of physiogenic action. If we want to empty the stomach by means of tartar emetic, we must give a sufficient dose to produce the pathogenic effect of vomiting.

Dose not a fixed quantity.

116 A. Hence it follows also, that if the action of medicinal substances be considered in this light, we must give up the habit of prescribing fixed and invariable doses. The dose must vary for each patient, and ought never to be a fixed quantity, but such as will be sufficient to produce a given physiogenic or pathogenic action, correlative with the therapeutic effect we wish to obtain.

Its practical application.

117. This view is not a mere verbal distinction, but will open up a new line of therapeutical practice. The special object of this book will not allow of my dwelling on the point any further. Its practical value will be seen by the easy means it affords of classing the different phenomena produced by the use of the hypophosphites, from which as a starting point we shall be able to formulate precise rules of treatment. As already said, I have used either clinically or experimentally, as phosphorized, oxydizable, and assimilable compounds, besides hypophosphorous acid, the hypophosphites of potash, soda, ammonia, lime, baryta, magnesia, strontia, alumina, iron, manganese, zinc, and quinine (100—112L). The hypophosphites of lime and soda have always given clear and definite results.

They are the only ones which ought to be prescribed in phthisis, and it is to them that what follows chiefly refers. I shall add a few words about the others further on (237—245).

Physiogenic effects; nervous energy. 118. One of the first effects produced by the use of the hypophosphites is a general increase of nervous energy, with an unusual feeling of ease and comfort. When all other conditions are the same, the greater the weakness and nervous excitability of the subject, the more strongly marked is this effect, and the sooner it is produced.

Appetite. 119. The second effect is an increase of appetite, which sometimes becomes enormous; as a natural consequence of this fact, digestion is much improved and the bowels also become more regular in their action.

Hæmatosis. 120. These phenomena are soon followed by increased activity of hæmatosis or the blood-forming process. As I stated when I first published my discovery, both the quantity and colour of the blood are so rapidly increased, that the hypophosphites are undoubtedly the most powerful hæmatogens hitherto known.

Venous plethora. 121. After a time, which varies with the constitution of the patient and the doses given, there are evident signs of venous plethora, as shown in the colour of the face, the redness of the mucous membrane of the lips and eyes, and the fulness of the superficial veins. Sometimes this effect is so strongly marked, that persons who all their lifetime have looked pale and delicate put on the appearance of full and robust health. When this stage has been fully reached, if blood be withdrawn from the patient, or be lost by accidental hæmorrhage, it will be found much darker than in the natural state; so much so that the patient's attention is usually struck with this appearance. **Menstruation.** The same character is observed in the menstruation, which becomes easier, more abundant, and more regular.

Weight. 122. The patient also generally gains in weight, although there does not seem to be at first any increase of adipose tissue. If the subject be young, growth is notably excited, and children, while taking the hypophosphites, never show the signs of weakness and emaciation to which they are otherwise prone after too rapid development. **Growth.**

123. This increase of nutritive action is sometimes remarkably manifest in a development of the hair and teeth, even in subjects already far advanced in consumption. Among the thirty-four cases which I first published, this had occurred in two instances. Dr. Quain, in criticising my views, thought proper to assume that I claimed this to be an ordinary and constant effect produced by the use of the hypophosphites, an absurdity of which I am willing to allow him all the honour. What I did state, and what I now repeat, is that, I had had several cases, and have since had several more, where patients in the second and third stages of consumption have seen their hair recover its growth and luxuriance, and have cut one or even two wisdom-teeth. Dr. W. H. Sterling of Burlington, New Jersey ('American Journal of the Medical Sciences,' January, 1869), has published a similar and very remarkable case of the efficacy of the hypophosphites in arresting the rapid decay of teeth during pregnancy.—See Appendix, III. (130). **Hair and teeth.**

124. In the first teething of children the hypophosphite of lime produces an *heroic* effect, and if properly used, will act as a preservative against all the accidents of this difficult period of life. When given to teething children who are pale, peevish, sad, emaciated, without appetite or strength, suffering from fever and diarrhœa, loss of sleep, and apparently in imminent danger of convulsions, I have never seen a single case where the whole of these symptoms have not yielded to a few doses of hypophosphite of lime, and the evolution of the teeth afterwards proceed as if in perfect health. **Teething of children. Convulsions.**

Genito-urinary functions.

125. Only one patient among those whom I questioned on the subject seems to have experienced any action upon the sexual functions, except such as might be attributed to the general improvement of the system; but in cases of spermatorrhœa I have frequently seen that symptom disappear, even when of long standing. The sedimentary deposit commonly found in the urine of consumptives, usually diminishes or disappears under the influence of the hypophosphites.

Experiments on animals.

126. I formerly undertook a considerable series of experiments upon young animals by taking a litter either of puppies or rabbits, giving the hypophosphites to one-half of the animals belonging to one litter, and none to the rest. I invariably found that within certain limits the strength and growth of the animal was proportionate to the amount of hypophosphite he received. Some of these facts were published for the first time in a paper read before the Academy of Paris, and no doubt they will one day find a practical application in the rearing of animals, after which children, perhaps, will be allowed to get the benefit of them in their turn.

The following results upon a litter of five rabbits are given as an example:—

The three first rabbits received doses of the hypophosphite of lime varying from ¼ grain to 4 grains daily, but the dose given to No. 1 was twice that given to No. 2, while this latter in its turn got twice the dose given to No. 3. The two others got no hypophosphite at all. They were all allowed as much food as they could eat, and were placed in other respects in exactly the same conditions. The treatment was begun on February 28, and left off on March 28. They had been born January 18.

	Weight at commencement of treatment, February 28	Weight on March 28	Gain
No. 1.	961 grammes.	1,361 grammes.	400 grammes.
No. 2.	1,114 „	1,511 „	397 „
No. 3.	1,217 „	1,549 „	332 „
No. 4.	1,277 „	1,429 „	152 „
No. 5.	1,267 „	1,399 „	132 „

The hypophosphite was dissolved in a small quantity of water, mixed with a little bran, and given in the morning before any other food.

Hypophosphites a primordial stimulant.

127. From what precedes we may conclude that the hypophosphites have a twofold action: they produce an immediate increase of the principle, whatever it may be, which constitutes nervous power; and they are the best, the most rapid, and the most powerful hæmatogens hitherto known. The intimate connection which exists between these two classes of phenomena, and their direct sequence under the action of the hypophosphites, point to the conclusion that the primary action of these salts consists in their stimulating some one or more of the primordial conditions of general nutrition, either by modifying the function of hæmatosis, or by acting directly upon the nervous system of organic life. I shall return to this point in Chapter VIII.

Pathogenic effects. Disturbance of nervous energy.

128. When the hypophosphites have been taken too long, or in too large doses, the first pathogenic effects generally show themselves in the nervous system. Patients, who up to that time had felt a gradual or a permanent increase of strength, begin to complain of weakness, perhaps of a feeling of lassitude, of vague or wandering pains in the limbs, of somnolence. Sometimes the feeling of lassitude may be carried as far as complete prostration. If this is allowed to proceed, it may be followed by headache or giddiness, disturbance of the

eyesight, noises in the ears, and fever may finally supervene.

Digestive function. 129. The digestive function is equally disturbed. The appetite, which had before increased, may fall away or be completely lost. There may be cholic and diarrhœa.

Hæmatosis. 130. All these signs, which point to some disturbance of the nervous system, seem to be directly connected with an exaggeration of the function of hæmatosis, and are accompanied or preceded by disturbance of the circulation. The breathing may become short and uneasy, there are pains in the chest, an aggravation of the cough and expectoration, and at this period auscultation frequently shows increase of the local signs consequent upon augmented hyperæmia of the lungs. If, in spite of these symptoms, the use of the remedy is persevered in, hæmorrhage takes place from the respiratory or the digestive mucous membrane.

Epistaxis and hæmoptysis. 131. This generally makes its first appearance in the shape of epistaxis or bleeding at the nose, after which there may be an attack of hæmoptysis, perhaps for the first time.

Intestinal congestion or hæmorrhage. 132. Some patients, after being kept for a certain time in this pathogenic condition, find that they are affected with hæmorrhoids for the first time, or that those which they formerly had, and which had disappeared, are reproduced. This may even go to the extent of real intestinal hæmorrhage.

Favouring conditions. 133. Most of these symptoms may show themselves from the very beginning of the treatment, if it is begun with too large doses. They are more easily and more rapidly produced in proportion to the youth and sensitiveness of the patient, as in the case of women, children, and people of nervous temperament.

Importance of these signs. 134. Among the different signs of this pathogenic condition, two deserve particular attention—fulness of the face, and epistaxis or bleeding at the nose.

The fulness of the face, as the term indicates, refers to a peculiar look of the patient, similar to what may be observed in delicate persons after a hearty meal or after moderate exercise. The colour resembles that of perfect health, the cheeks are less hollow, sometimes appear quite full, and, when this state has reached its maximum, there is a slight swelling or puffiness of the malar region and the lower eyelid. This peculiar aspect is not the same as the look of hectic fever. The redness of the facies is not sharply circumscribed to the cheeks, but spread over the whole face, as in a state of health. When once noticed it is easily recognised again. The slighter the amount of local lesion, the more strongly marked it appears, and the earlier it occurs: sometimes at the end of a few days. It is more apparent in persons of a lymphatic or sanguine than in those of a nervous or a bilious temperament. This is a sign of great clinical value, for it indicates that the physiogenic action of the remedy is near or has already reached its maximum. It is, therefore, highly important that it should be recognised in time, as it allows the practitioner to foresee, and consequently, by suspending or decreasing the treatment, to prevent those accidents or complications which would not fail to follow if it were injudiciously persevered in. **Fulness of the face.**

134 A. When the local lesions are not too far advanced, most people who have used the hypophosphites for a certain time acquire, as has been already said, a look of health, which becomes permanent, and which is a proof of the increased energy of nutrition and hæmatosis. This fulness of the facies marks the limit of physiogenic action.

134 B. Epistaxis or bleeding at the nose shows that the patient is entering the sphere of pathogenic phenomena. These latter are frequently preceded by this sign, which is, therefore, peculiarly worthy of attention. Bleeding at the nose, although far less frequent than **Epistaxis.**

hæmoptysis, may occur, it is true, in a certain number of consumptive cases, independently of any effects produced by the specific treatment. The two symptoms, perhaps, depend upon the same cause—local congestion aggravated or produced by cough.

Clinical statistics of epistaxis and hæmoptysis.

135. But the following statistics will at once show that there is an important semiological distinction between the two symptoms, at least as far as concerns patients who are taking the hypophosphites. Fifteen patients, while under the specific treatment, showed once or oftener signs of bleeding at the nose; only one had ever done so before; while of 23 patients who spat blood while taking the hypophosphites, 20 had experienced the same accident before using the specific treatment. (Paper read before the Academy of Sciences at Paris, May 31, 1858.) This sign, therefore, is of very great importance; but the practitioner must remember that the quantity of blood discharged from the nose is very variable; sometimes it may be large, sometimes very small, merely a drop or two, so that the patient has to be carefully questioned, otherwise he will take no notice of a symptom which is apparently of no importance. I must add that this symptom is now seldom observed in patients under my own direction, as I prescribe smaller doses than formerly, and am satisfied with less immediate but slower and more certain results.

Therapeutical action.

136. I have shown the necessity of distinguishing between the physiogenic action of a remedy and its pathogenic manifestations. In like manner it is indispensable that a distinction should be made between its therapeutic effects and the curative result.

As already pointed out, the therapeutical effects of a medicinal agent are the result either of its physiogenic or of its pathogenic action; but they are of a more complex order, while they are less complex than the curative result. Each step in these different orders of phenomena, therefore, requires for its manifestation an increasing number of conditions, because each variation in the scale is more complex than the one which precedes it. The cure will be the final term, the result of the different antecedent modifications thus produced in the system, and can only be arrived at provided they are maintained within certain limits, and kept up for a sufficient length of time.

On functional symptoms.

137. The following are the therapeutical results noted in the 79 patients already referred to (60). I shall first relate the modifications produced in the functional symptoms, and afterwards those observed in the lesion or physical condition of the lungs.

Weakness.

138. Seventy-one patients complained of weakness, and 32 recovered their strength, but with 3 the recovery was not permanent. Thirty-four were noted as having improved in strength. For 2 patients the observations were incomplete. Total number of cases influenced by the treatment, 66 out of 71.

Emaciation.

139. Sixty-five patients had lost flesh, 19 gained flesh while under treatment; in 1 of these the improvement did not continue. Total number of cases influenced by the treatment, 19 out of 65. Independently of these 19 cases, there were a number of patients who ceased to lose flesh while under the treatment; but these statistics are very incomplete, because they are founded merely upon the personal impression of the patients, who were not actually weighed.

Change in weight NOT a preponderant sign.

139 A. Since these figures were collected, I have carried out an extensive series of independent experiments on the subject by carefully weighing the patients, and I have come to the conclusion that the results arrived at in this way are of little or no value for the *prognosis of the disease.* The reason for this will be found in the following considerations. In a case of acute or rapid phthisis, even while the lungs are yet but slightly involved, the emaciation may be very great, and in this

case, as it depends upon the constitutional condition, the removal of this under the action of the specific remedy will necessarily be followed by the restoration of nutrition and increase in weight. In more chronic cases, particularly if the disease be far advanced, and an extensive amount of lung be involved, as long as the tubercular matter remains quiescent or apparently inactive the patient may gain flesh, and yet after all may not recover, owing to the evolution of the local disease. The tubercular matter may eventually go on to softening, and produce destruction of the lungs incompatible with life, either through the influence of some intercurrent or accidental inflammation, or because the morbid deposit is too far advanced or too extensive to be got rid of by reabsorption and elimination. We thus have two types, in one of which the patient loses flesh for a time while under the treatment, and eventually gets well; in the other he gains flesh at first, and ultimately dies. (See Dr. Denobele's Cases in Appendix III.)

In a third type of cases the local lesions may be extensive, far advanced in their development, may, for instance, have reached the third stage. The diathesis is still active, and the emaciation goes on increasing. In a case of this kind the specific remedy, as before, removes the diathetic condition. Such portions of the lung as are not anatomically disorganised may be restored either partially or wholly to their natural condition, but the rest of the lung, which is either actually destroyed or become organically unfit for functional use, can never become sound. The patient, therefore, may either simply cease to lose flesh any longer, or may regain a part of what he has lost; but the function of nutrition will necessarily be lowered in its action in order to keep up the equilibrium of the system. If a man has less lung he will have less breathing power, consequently less hæmatosis and less nutrition. Health is the equilibrium of all the functions. If one of these is impaired, the intensity of all the rest is diminished. Gain or loss of weight has therefore not the importance and value which are usually attributed to it. (See Cases in Appendix III.)

140. Forty-four patients suffered from fever. In 24 the fever diminished, in 37 it disappeared, but only permanently in 16. Total number of cases influenced, 41 out of 44. **Fever.**

141. Night sweats were noted in 56 cases. They diminished in 9 and ceased in 44, but for 11 of these only for a time. For 3 patients the record is incomplete. Total number of cases influenced, 53 out of 56. **Night sweats.**

142. Fifty-two patients had lost their appetite. Improvement in 11 cases; complete return of appetite in 39 cases, which for 7 of these was only temporary; record imcomplete for 2 cases. Total number of cases influenced, 50 out of 52. **Loss of appetite.**

143. Twenty-one patients complained of vomiting. Four improved; in 13 it disappeared, but afterwards returned for 5 out of that number; in 1 case the result was not noted. Total number of cases influenced, 17 out of 21. **Vomiting.**

144. Thirty-six patients complained of want of sleep. In 15 cases there was an improvement; 17 cases recovered sound sleep, but 3 of these only for a time; for 4 cases the record is incomplete. Total number of cases influenced, 32 out of 36. **Sleeplessness.**

145. Seventy patients complained of shortness of breath. In 25 the breathing improved; 38 recovered their natural wind, in 1 case this was only temporary; in 5 more cases the change was not noted. Total number of cases influenced, 63 out of 70. The remarks made upon variations in weight are equally applicable here (139 A). **Dyspnœa.**

146. All the 79 patients had cough. There was an improvement in 43 cases; in 31 it ceased altogether, but **Cough.**

in 1 of these afterwards returned; in 1 case the result is not stated. Total number of cases influenced, 74 out of 79.

Expectoration. 147. Expectoration was noted in 76 patients. There was an improvement in 39; it ceased altogether in 27, but in 5 of these afterwards returned; in 1 case no record of change was made. Total number of cases influenced, 66 out of 76.

Diarrhœa. 148. Ten patients were suffering from diarrhœa. It ceased in 8 cases. Total number of cases influenced, 8 out of 10.

Menstruation. 149. Dysmenorrhœa was noted in 6 cases. Two patients improved; in the 4 other cases the function was restored to its normal state, but for 2 of these only for a time. Total number of cases influenced, 6 out of 6. Amenorrhœa existed in 8 cases, and in 6 the function was restored. Total number of cases influenced, 6 out of 8.

Strength. 150. As far as muscular power is concerned, 48 patients had been obliged to leave off work altogether; 27 were able to return to their occupations, but 4 only for a time. Total number of cases influenced, 27 out of 48.

Constancy of action. 151. The above is a summary of the symptomatic modifications produced by the use of the hypophosphites. In nearly every case one or several of the morbid phenomena were diminished or modified at least for a time, so that there was at least an improvement, even if only temporary, in almost every case. Further on I shall endeavour to show the value of this fact.

Effect on the state of the lungs. 152. The changes produced by the treatment in the percussion and auscultatory sounds may be of three different kinds; there may be a complete disappearance of the morbid sounds; there may be simply a decrease, or there may be a passage from one kind of morbid sound to another after an aggravation of greater or less duration. In my French work, 'De la Cause immédiate de la Phthisie,' etc., Paris, 1864, p. 617, where these facts were originally published, will be found the different observations upon which they are based.

Disappearance of tubercular deposit.

153. In many cases the local signs which are pathognomonic of tuberculosis in the second degree may disappear completely without leaving any trace behind, which authorises the conclusion that this has been effected by resolution and reabsorption of the tubercular matter. Until my discovery of the hypophosphites, this mode of cure had been observed so rarely in consumptives arrived at the period of softening that most pathologists either denied or doubted its possibility. But there can be no doubt of the fact for those who have seen the curative action of the hypophosphites. Out of the 79 cases to which reference has already been made, this occurred for 16 cases. But I have since then observed this result in thousands of instances. It will be found to have occurred in 7 of the 20 cases in the third stage observed by myself, and which are given in Appendix III., Cases 1—24. In these cases one lung was in the third stage, and the other in the second stage; the latter organ was entirely restored to health. A similar result will be found in several of those which have been published by other observers, and which are given in the same Appendix.

Arrest with induration.

154. Sometimes, although recovery takes place, a portion of the lung, which had been the seat of the disease, remains indurated or consolidated. There is probably either encystment, cretification or incomplete elimination of the tubercular matter, or the lung tissues have become permanently consolidated and indurated. This result was noted in 6 cases of the 79 already referred to.

Arrest with cavity.

155. In another class of cases recovery only takes place after complete softening of the morbid deposit with ulceration of the lung tissue involved, and the formation of an excavation. This occurred for 4 cases in

the series of 79. But in Appendix III. will be found another series of 20 cases of the same kind, collected from my private practice, in the course of little more than two years of my first use of the hypophosphites in Paris.

Although this mode of cure in consumption had been occasionally noted previously to the use of the hypophosphites, it was of such rare occurrence that very few practitioners had been able to observe more than one or two cases in a long series of years, as may be seen by referring to the quotations already given (34, 35, 40). With the use of the hypophosphites this mode of termination is one of frequent occurrence. I am probably under the mark in saying that I have now observed several hundred cases of this kind, and further on I shall show that the reality of this mode of cure by the hypophosphites is now fully corroborated by the testimony of other observers. In these cases, although the lung has sustained a permanent loss of substance, the patient is nevertheless cured, at least as far as any cure is possible.

Variability of final result.

156. But in instances terminating in this way, as also in the preceding one by induration, the final condition of the patient may vary in different cases. In some there will be no general symptoms at all left, not even shortness of breath; the patient will be able to undergo as much, or nearly as much, exertion and fatigue as before. There may be no cough, no expectoration, and the patient may enjoy robust health, while even here the pectoriloquy and cavernous breathing will give undeniable proof of the existence of a cicatrised excavation. In other instances the lung tissue, which has not been destroyed, may not have been so completely restored to its normal condition, or the cavity may be more extensive than in the former case; and then, although the arrest of the original disease may be as complete as in the former instance, though the

tubercular diathesis, which is the real disease—the *fons et origo mali*—may have entirely disappeared, though there may be no tendency to its recurrence, and consequently to a relapse, the patient's health may not be so completely restored as in the first instance and may present every intermediate shade of difference between perfect ease and comfort, except during violent exertion, and a very unstable degree of well-doing, where the amount of vital and organic activity remains very low, where the patient is a sufferer from every external variation, and where the lungs are in a constant state of accidental congestion or inflammation. This state of things will be more or less strongly marked, according to the amount of lung tissue which has been destroyed or more or less damaged by the disease. It will generally be found gradually to improve, with proper care, and, above all, the avoidance of cold and exposure, particularly if the patient winters in a warm climate. This progressive condition usually lasts from two to three years, at the end of which period only the patient may be said to have reached the full improvement of which his condition is susceptible.

Asthmatic symptoms.

157. When recovery takes place by the second process—induration—or when the lung remains with several very small cavities, also where there appears to be pleuritic adhesion, it frequently happens that the chief symptom of which the patient still complains is breathlessness. This may be aggravated by congestion or inflammation, consequent upon intercurrent attacks of bronchitis, and in such cases the patient thinks, and is often told, that he suffers from asthma. This secondary consequence of arrested phthisis is not special to cases treated by the hypophosphites, but is also occasionally noticed in cases of spontaneous cure, which induced the late Dr. Ramadge to propose that consumption should be cured by making the patient asthmatical. Upon this principle we might

say that as lameness often follows arthritis or inflammation of a joint, say the knee for instance, the way to cure a patient of white swelling of the knee is to make him lame.

Injudicious use of specific.

158. When patients suffer from these secondary consequences after taking the hypophosphites, it will be found that the too free or too prolonged use of them may not only induce hæmorrhage or favour inflammation, as already explained (130), but even produce in the newly-formed cicatricial tissues a state of permanent turgescence or irritative and active hyperæmia which may persist long after the primary disease has disappeared and the diathesis has ceased, even although the remedy has been left off. The symptoms produced by this condition vary. Sometimes there is dry, harassing cough, sometimes, as in the case of large cavities, copious and exhausting expectoration; at others the patient chiefly complains of dyspnœa, and the shortness of breath may even be so great as to simulate real attacks of asthma. All these symptoms may be sometimes met with as the sequelæ of consumption arrested spontaneously, or by the use of the ordinary hygienic and medical means, but when occurring in patients who have followed a regular treatment by the hypophosphites, it will always be well to examine whether they may not be referred to the use of over-doses, or to the too-prolonged action of the remedy, the suspension of which is usually followed by a disappearance of the aggravations.

Stœchiological inhalants.

159. In all such cases the use of the inhalants is almost always efficacious, and generally produces immediate relief! I have stated above that it often requires a considerable time, sometimes as much as several years, before the patient in a case of arrested phthisis with persistence of local lesions, attains all the improvement possible in his case. But the *stœchiological inhalants* usually make short work of the matter and produce with

nearly perfect certainty in a few months, even during the winter and in the climate of London, a result which otherwise might only be reached after years of care, or perhaps never attained at all. (See 506, 507, 508, and Appendix IV.)

Conditions of these results.

160. The question now occurs, When are these several results obtained by the use of the hypophosphites? Is it merely by chance—that is, owing to some undetermined cause—as in the cases of cure obtained by other means? Is it so seldom that they may really appear doubtful? No. It is in every case where the remedy is properly used, and where the patients at the beginning of the treatment are in such a pathological condition that a cure is still possible. What these conditions are has been already explained (59), and there is no undue assumption in saying that the prognosis of no disease has hitherto been established upon a more accurate basis. I have shown that the primary condition for a cure depends upon the extent of the tubercular deposit (61). The second condition is the degree of evolution which that deposit has already reached. When that has not passed the second degree, and the disease is limited to one lung, a favourable prognosis may be laid down with almost mathematical certainty (62, 63). A third condition is the acute or chronic type of the complaint (65). A fourth and last series of conditions depends upon the existence or non-existence of complications (71). In a word, the prognosis of a case of phthisis, when subjected to the *rational use of the specific treatment*, depends almost entirely on the pathological state existing at that moment, and a cure may be expected in all cases where the organic disease is not already sufficient to produce death either directly by itself, or by the consecutive disturbance caused by its natural evolution. These are the limits of all real science, because all real science can only be conditional. To ask for more would be absurd, to pretend to do more would be an imposture. My adversaries, in attributing

such pretensions to me, have merely followed out their usual plan of disfiguring what they could not refute.

Importance of local diagnosis.

161. The importance of accurately determining the site, the extent, and the degree of the local lesion, in order to find a sure basis for prognosis, requires that a new view should be taken of the local diagnosis.

Necessity of accurate auscultation.

162. The full value of accurate auscultation now becomes apparent, and practitioners for the future, instead of simply auscultating a patient for the mere purpose of deciding whether he is or is not consumptive, must examine him with the same attention and minuteness as in a case of pneumonia, or pleurisy, or heart disease. Without the resource of the hypophosphites, it is a matter of small moment to the patient and his friends to determine whether one or both lungs be involved, whether the deposit occupies a large or a small portion of these organs. The final result, as was shown in the second chapter, will in all cases be pretty much the same, and is merely a matter of time (11, 33—44). It often happens that, in examining a case of phthisis, the auscultator will diagnosticate the tubercular deposit, as extending no further than where the lung gives signs of softening, while in reality a much more considerable portion may be invaded by tubercles in the crude state to such a degree that the respiratory process going on is barely sufficient to maintain life, as shown by the amount of dyspnœa. This latest deposit of tubercular matter may sometimes be so far advanced, that it must necessarily go on to softening, or this process may be set up by the slightest amount of intercurrent inflammation. Not only therefore must the examination of the chest be made with all the care and accuracy the practitioner is capable of, but his diagnosis of the extent of involved lung must be based not upon the physical signs alone, but also upon all the rational symptoms which can throw any light upon the subject. As in the diagnosis of the nature of the disease itself, so also in that

of the amount of physical lesion, the only sure basis is the concordance of both the physical and the rational phenomena.

It may sometimes happen that even an experienced and skilful physician, by taking account exclusively of the auscultatory signs, will think the local mischief is but slight, when it may already be very serious indeed—perhaps even hopeless. This will generally be indicated by the want of that proportion and concordance between the local signs and the intensity of the general symptoms, and, above all, the amount of difficulty of breathing which I have just mentioned.—See Cases 73, 74, in Appendix III. This is particularly applicable to cases of rapid tuberculization (66).

I have seen several cases of consumption where the most eminent auscultators have neglected accurately to state the extent of the local lesion in their diagnosis, even when given in writing. Two such will be found fully reported at pp. 620 and 621 of my French work ('De la Cause immédiate de la Phthisie,' etc., Paris, 1864).

The subject of the first of these cases was a Russian prince, who is now living and has been in the enjoyment of perfect health for upwards of fifteen years, thanks to the use of the hypophosphites, and who, the day before he was placed under my care, had been examined by three of the most eminent physicians and auscultators, I may say not only in Paris, but in the whole world. There is not an auscultator of any fame in this country who, like myself, has not sat at their feet, or at those of their disciples. One gave as his diagnosis—'Softened tubercles at left apex;' another, 'Softened tubercles at right apex;' while the third stated, 'Softened tubercles at both apices.' On examination I found these three statements were all correct, and that, moreover, there were a certain number of tubercles disseminated throughout both lungs. Now what was the cause of these discrepancies? Simply that these gentlemen thought it sufficient to establish the nature of the complaint, that neither of them supposed there could, at this stage, be any doubt as to the ultimate prognosis, and the two first deemed it useless to alarm the family any more than was absolutely necessary. The discovery of the specific of phthisis now enables the practitioner to make the fullest use of Laennec's wonderful invention, and to lay down the prognosis of tubercular disease with an accuracy inferior to that of no other branch of medicine, or even of surgery itself.

Apparent aggravation.

163. The reader must not suppose that the results above described (153, 154, 155) are attained smoothly and uniformly in all cases. Sometimes, as already mentioned, it is only after a temporary aggravation of the auscultatory signs that the lung is freed from the tubercular deposit. In such cases these signs will be often found to undergo a gradual and progressive transformation from above downwards, as if the lung were composed of different layers of diseased tissue exactly in the same order as we know the tubercular matter itself is deposited. For instance, moist or dry crepitus may be found at the apex; lower down there may be dullness on percussion, and as yet nothing more than puerile, or bronchial, or diminished respiration. The crepitus may disappear at the apex, be succeeded by natural breathing, and then be found lower down, where previously there were no signs of softening. These in their turn may also disappear, and again be reproduced for a while in a lower portion of the lung, so that for a time there may appear to be a local aggravation of the disease, although the patient is really on the high road to recovery. This remarkable series of clinical phenomena, analogous to the *rhonchus crepitans redux* in pneumonia, was unknown previously to my discovery of the action of the hypophosphites, and was first pointed out in my paper read before the Academy of Sciences (May 31, 1858).

Conditions favouring resorption.

164. The circumstances which appear most to favour a cure by resolution are the recentness of the deposit, the incipiency of softening, the freedom during the treatment from accidental intercurrent bronchitis, lastly, the youth of the patient. This last condition agrees with the well-known fact that cavities are of rare occurrence in young children (153).

164 A. When these conditions do not exist, the softening of the deposit must go on, and a cure can only take place after the formation of a cavity (155).

Scale of lesions.

165. The following is a graduated scale of morbid conditions, under which almost every possible case may be classified:

1. The diathesis with little or no deposit.
2. Confirmed deposit confined to a portion of one lung, and in the first stage.
3. Deposit in the second stage in one lung.
4. Deposit in the first stage in both lungs.
5. Deposit in the first stage in one lung, and in the second in the other.
6. Deposit in the second stage in both lungs.
7. The third stage—excavation, with only one lung affected.
8. Both lungs affected, one in the third, the other only in the first stage.
9. One lung in the third stage, one in the second.
10. The third stage in both lungs.
11. Complications such as diarrhœa, laryngitis, etc.

165 A. Under the influence of the hypophosphites I have seen recoveries take place in every one of these conditions with the exception of the complications I have already indicated as necessarily fatal (71—85). To make me say, as has been done by some of my adversaries, that the number of successful results can be the same in all these different stages, and that a case under No. 9 or No. 10 is as likely to recover as one classed under No. 1 or No. 3 is

one of those wilful and malicious misrepresentations which have been continually used against me for seventeen years past. At each step in the downward course the difficulties and complexities of the treatment increase, and the curative result becomes more distant and more precarious. Still such a result *may* be hoped for or obtained, as long as there is lung tissue enough left to support life.

The use of the stœchiological inhalants confirms and greatly extends the curative results obtained by the hypo phosphites alone. In the early stages they may be unnecessary, in later ones advisable, in others very useful, and lastly sometimes altogether indispensable. The main point is to act in time before the local disorganisation has proceeded beyond a certain extent. Because the treatment may prove unsuccessful in stages 8, 9, or 10, people have no right either in their own case or in that of their friends to comfort themselves, as I find they frequently do, with the reflection that they have done all they could when they have only appealed to it at that period, although they knew of it and might have used it in stages 1, 2, 3, 4, or 5.

Relapse. 166. What is the final value of the result obtained in a case of phthisis when the lung has been completely healed, or when it has become cicatrized by the use of hypophosphites? Is the patient safe, or is he at any time subject to a relapse? Several hundreds of patients who have been cured by me in the first or second stage by the process of absorption or elimination of the tubercular matter, and whom I have had an opportunity of examining since their recovery have remained in perfect health by means of the occasional use of the hypophosphites in prophylactic doses. Of the patients who had only recovered with the persistence of a greater or less amount of disorganisation in the lung tissue, all those who have come under my notice for the last seventeen years, and who have been able to take proper care of themselves, and to avoid exposure to cold and over-fatigue, have continued for years to enjoy nearly the same amount of health, if not more, as immediately after their recovery. Some have since died of other and altogether different diseases. Where health has not been maintained, and there has been any return of lung disease, the relapse has always been owing to local, non-specific, non-tubercular inflammation (on this point I am particular) of a catarrhal or bronchial nature, induced by the weather or other external causes. After more than seventeen years experience I see no reason to qualify this assertion, which might be supported by any number of instances.

Checked by the inhalants.

167. This, however, would be superfluous in the present state of stœchiological therapeutics. All the accidental lung complications incidental to arrested phthisis are immediately and wholly amenable to local treatment by means of my new inhalants. Collecting cases would, therefore, be a mere waste of time. By the use of these new compounds, the accidental inflammation produced in the adventitious or consolidated tissues may always be controlled, and the patient is in no danger, provided he has enough free lung tissue to breathe with, until the inhalant has produced its effect. If such be not the case, it is evident the prognosis must be unfavourable. Thus, in a case of arrested phthisis, one of the lungs may have been damaged to such a degree that its breathing power, when working alone, is insufficient to support life. Should the other lung be so far involved in accidental inflammation as to be functionally disabled, the patient must evidently die before the local remedy can have time to act.

Mistakes caused by local signs.

168. The practitioner who has had but little or no experience in the use of the hypophosphites, and still less faith in their efficacy, is often ready to mistake these accidental inflammatory complications for a recurrence of the disease and a recrudescence of the tubercular deposit.

Softening.

168 A. The signs of accidental or incidental softening ot tubercular matter which was previously in a crude state, or else increased peri-tubercular hyperæmia, which is one of the conditions of resolution and resorption (163), are also sometimes mistaken for those of fresh tubercular deposit.

Accidental inflammation.

168 B. Occasionally, accidental inflammation of incipient cicatrices, or of tissue that was only consolidated, or transient inflammation of new tissue, may equally be mistaken for new tubercular deposit.

Means of avoiding this error.

More extended experience, a due regard to the rational symptoms, and, above all, attentive stethoscopic examination, will, however, usually lead to a more correct opinion.

168 C. When the recovery is still recent, the stethoscopic signs, which may be those of congestion, bronchitis, or even of pleurisy, or pneumonia of different extent and intensity, usually occupy the seat of the primitive local lesion, and may thus mislead the inaccurate or inexperienced, above all, the prejudiced, practitioner. I have seen several cases where accidental inflammation in an excavated lung, which had been cicatrized by the use of the hypophosphites, has been mistaken for the very last stage of phthisis by the most distinguished physicians. In my French book ('De la Cause immédiate de la Phthisie,' Paris, 1864, obs. 59, p. 294) I have reported in full a case of this kind, where the patient, who had been given up as lost beyond all hope by three of the first physicians in Paris during an accidental attack of intercurrent inflammation in a large cicatrized cavity, continued for ten years afterwards, while still showing the auscultatory signs of an excavation, to enjoy the most robust health to such a degree that he took unto himself a second wife. Since then I have had several similar cases.

168 D. Where the cicatrization has already lasted some time the diagnosis is less open to error, as in that case

the inflammatory complication instead of specially affecting the new cicatricial tissues, occupies the place for which it shows a predilection in the healthy state. The signs of bronchitis, for instance, will thus frequently be found limited to the base of the diseased lung, even though there may be a cavity at the apex. Sometimes when only one lung has been diseased, the signs of bronchitis will be found at the base of the sound one. This is, perhaps, in fact, the more frequent case of the two. It is generally met with in workmen after excessive fatigue, showing that the congestion is produced by overwork of the sound lung. In a patient with a cicatrized excavation there may be, therefore, two different causes of inflammatory accidents. In some instances they may be owing to local hyperæmia of the cicatrized lung, while in others they are due to the overwork required from the sound lung. This latter condition appears to be a much more active cause of suffering among the working classes than climatal or meteorological conditions. In all such cases the unseasonable use of the hypophosphites may be very prejudicial, on account of their power of stimulating hæmatosis, and thus favouring congestion; while, on the contrary, the accidental complication will frequently be found as amenable to proper antiphlogistic treatment, and above all to the use of the stœchiological inhalants, as in cases of simple inflammation without any antecedent tuberculosis. In these instances, the cautious and tentative administration of the hypophosphites may sometimes be used as a valuable means of diagnosis. This is another proof of their specific action—*naturam morborum ostendunt curationes.* One of the most delicate points for the physician's decision is the true moment when it becomes advisable to resume the specific treatment after the occurrence of accidental inflammation.

Recurrence of tuberculosis.

169. I therefore confidently repeat the assertion I made many years ago that as long as the patient is kept

in a proper physiological condition by the prophylactic use of the hypophosphites, according to the rules which will be given further on, I have never witnessed a recurrence of a fresh attack of tuberculosis. Now all practitioners, who have seen a large number of consumptive cases, know how frequently this happens, particularly in children, when the treatment is confined to the ordinary means, such as cod-liver oil, tonics, &c. Even in instances where, owing to the general condition of the patient, without any local signs in the lungs, there has only been a suspicion of phthisis, how often does it happen that after an apparent return to health, of greater or less duration, the disease shows itself a second time, too frequently in an unmistakeable manner. The means which appear to have answered in the first instance are now seen to fail, and the disease runs its course to the fatal end. These are the instances where the hypophosphites again and again show their wonderful efficacy. I could relate *any number* of cases observed at my dispensary at Paris among poor and ill-fed children, where whenever the hypophosphites have been omitted, beyond a certain length of time, the disease has reappeared, and has each time been arrested, with the same success as at first. Such cases are true *experimenta crucis*, and demonstrate beyond doubt the 'specific' action of the remedy.

Testimony of other observers.

170. The preceding facts, collected from my own experience, have been nearly all confirmed by other observers. The following are some of the most important testimonies:—

Deforchaux.

171. Dr. Deforchaux ('Presse Médicale Belge,' No. 12, March 14, 1858, p. 95), physician in the Belgian Royal Navy, gave the hypophosphite of soda to sixteen patients, seven of whom were suffering from intestinal complications, while the other nine had no diarrhœa. In these latter cases Dr. Deforchaux noticed an increase of appetite, ease and rapidity of the digestive functions,

disappearance of weakness. 'The patients,' he says, 'left their beds and walked, the face assumed a healthy hue, their strength appeared to be fully restored, they told everyone they were certain of a cure, praised their doctor to the skies, and swore eternal gratitude to him.' So far for the physiogenic symptoms. Now comes the reverse of the medal, and the pathogenic symptoms begin. Dr. Deforchaux proceeds thus:—'After these pleasant illusions the appetite diminishes or fails, the tongue and lips become red and dry, the patients complain of thirst and ask for cold or iced drinks, thus indicating an irritative condition of the digestive system. In two cases there were bloody stools (132). Sometimes the diarrhœa increased, there was great restlessness at night, more profuse night-sweats, and great increase of fever. These symptoms would suddenly cease on the suppression of the treatment.' The reader who will take the trouble to refer to my description of the effects produced by the hypophosphites, will there find the key to all these symptoms (128—132). But it is due to Dr. Deforchaux to state that his experiments were made in 1858, when the first edition of my French work had not yet been published, and the details of the treatment, which he only knew through the summary published in the 'Bulletin de l'Académie de Médecine,' were very incomplete.

172. Dr. Santa Maria states that a case of consumption in the second stage, when treated by the hypophosphites, was followed by a rapid and radical cure (see Appendix III. Case 25). **Santa Maria.**

172 A. Dr. Vincente Gomez y Orland, Physician to the Military Hospital at Valencia, in an extreme case treated by him, where the patient had received the last sacraments of the Catholic Church, states that after eight days' treatment by the hypophosphites, the expectoration decreased one-half, the febrile symptoms were very much diminished, and there was great general improvement. **Gomez y Orland.**

The fortieth day expectoration and diarrhœa had both disappeared, and the patient was in full convalescence (see Appendix III., Case 26).

Maestre de San Juan.

173. Dr. Aureliano Maestre de San Juan, Professor of Clinical Medicine in the University of Grenada, in Spain, mentions the following physiogenic effects in one case:—Improvement in nutrition, hæmatosis, appetite, digestion, and strength. Improvement in cough, expectoration, fever, and night-sweats; complete change in the look of the patient, 'so much so,' says Dr. Maestre 'that the patient's system seemed to have undergone a complete transformation.' In another case he mentions increase of appetite, disappearance of diarrhœa, improvement of cough and expectoration, disappearance of fever, night-sweats, and thoracic pains; but on the fifteenth day of treatment we find the pathogenic symptoms of dyspnœa, feeling of heat and weight in the chest, chills, increase of cough, followed by spitting of blood. This was combated successfully, and the patient got well. In a third case, reported by the same physician, the physiogenic effects noted were, increase of appetite, improved digestion, better nutrition and hæmatosis, return of strength and spirits. The fever, diarrhœa, and night-sweats disappeared at the end of a fortnight; cough and expectoration were much decreased. On the thirty-fifth day the dose of hypophosphites having been increased, difficulty of breathing came on, with a great aggravation of the cough. Enlightened by the preceding case, Dr. Maestre decreased the dose, and the patient left the hospital cured. In a fourth case Dr. Maestre mentions among the physiogenic effects, improvement of respiration, increase of strength, appetite, and nutrition, decrease and ultimate disappearance of cough, expectoration, and all the other symptoms. On the forty-fifth day an increased dose of the remedy immediately produced its pathogenic effects — breathing became difficult, and cough much

increased. These symptoms disappeared with the suspension of the treatment, and the patient left the hospital well. Dr. Maestre sums up the result of his experience in the following words:—'1. The hypophosphite of soda, or lime, must be perfectly pure (87—93); this is one reason of the advantageous results obtained by me. 2. The hypophosphites should be given when the tubercular condition is, so to speak, isolated and free from complications. When it is accompanied by accidental complications of the respiratory organs, the specific treatment may aggravate the condition of the patient. In this case the remedy must be left off, to be resumed as soon as the complication has disappeared (158). 3. In the treatment of phthisis the hypophosphites should be used alone, and without any other drug, unless we wish to destroy their effect. 4. They should not be given beyond a certain dose, otherwise they produce unfavourable effects (128—134). 5. The alkaline hypophosphites are the *best remedy* hitherto known for the treatment of pulmonary tuberculosis.' (See Appendix III., Cases 27—30.)

These conclusions of Professor Maestre are particularly worthy of attention, as they were arrived at independently. The details of my treatment had not then been published, and Dr. Maestre only knew of it through the summary which had appeared in the 'Proceedings of the Academy of Medicine.'

Parigot.

174. In the April number of 1858 of the 'Journal de Médecine de Bruxelles,' Dr. Parigot, Professor in the University of Brussels, and physician to the Orphan Hospital, published a series of papers, in which he began by stating that he had until then never met with an unsuccessful case in the use of the hypophosphites. He says, with regard to the physiogenic symptoms, that in one case all the functions were restored to their normal condition. In a second case he mentions the return of appetite and sleep, decrease of cough, expectoration,

night-sweats, and hectic fever. In a third case, all the symptoms diminished, and finally disappeared. The recovery was so complete, that it was difficult to believe that the patient had ever been so dangerously ill. In a fourth case all the symptoms 'disappeared as if *by magic.*' In a fifth case the symptoms also entirely disappeared, and the respiration was restored to its normal condition. In a sixth case there was very great improvement. In a seventh, there was return of digestive power, decrease of all the symptoms, and complete disappearance of purulent expectoration.

Dr. Parigot concludes that '*unhoped-for success* may be obtained by the use of Dr. Churchill's treatment.' (See Appendix III., Cases 31 to 38.)

Reinvillier. 175. Dr. Reinvillier (in the 'Courrier de Paris,' April 22, 1858) reported two cases of cure in the *third* stage (64, 155), and noted return of strength, increase of weight, more abundant sanguification, disappearance of night-sweats, cough and purulent expectoration, and general improvement in the whole system. Dr. Reinvillier adds, 'If we reflect that examples of recovery in *this* stage of the disease are so uncommon, that many men who have grown grey in the profession have never witnessed a single case, it must be confessed that, though I only bring forward two cases, they cannot be said to be without value.' (See Appendix III., Cases 39, 40.) Five months afterwards, the same physician wrote as follows ('Courrier de Paris,' Sept. 9, 1858):—'I promised in my former paper to give an account of a larger number of observations of phthisis treated by the hypophosphites. I am now able to fulfil that promise. I have collected a considerable number of observations, some of cases treated by myself, *the rest by other physicians*, and I may state that the *phosphide* treatment has been found useful in almost every instance. Not only have consumptives been cured in the first stage of the disease, but also a large number of those who had gone through *all* the stages of this terrible malady (165). Are we hence to conclude that we shall be able to cure every case? Of course not. But what may even now be asserted is, that a cure is very often possible. This may, no doubt, appear an audacious assertion to those who may not have been eye-witnesses of our facts, or who have pinned their faith to the denials published by physicians who have been unsuccessful in the use of the hypophosphites. However, they will have to yield to evidence, and recognise that, amidst the great scientific movements of our time, the science of therapeutics has progressed like the rest, and has at last realised a grand conquest.'

Leriverend and Galvez.

176. Dr. Jules Leriverend, Professor of Clinical Medicine in the Faculty of Medicine at Havannah, and Dr. Galvez, of the same city, published the following statement in (June, 1858) 'Revista Medica de la Isla de Cuba':—'We cannot say that the results we have obtained have always been good, but sometimes the effect has been so advantageous, that we do not hesitate to assert that the hypophosphite of lime is *the best means* hitherto known against tuberculosis, provided the disease has not produced such a degree of disorganisation in the lungs by the formation of cavities, or the destruction of a large amount of lung tissue, as altogether to interfere with their functions' (165). In one case, that of a youth, the physicians note a return of appetite, an increase in weight of seven pounds, disappearance of all the local signs of the complaint, complete recovery, and *remarkable increase of growth* (123, 124, 126, 127). In two other cases the effects were similar. In another case there was increase of appetite, decrease of diarrhœa and fever, disappearance of night-sweats. (See Appendix III., Cases 41 to 44.) These two physicians give the following, as the result of their observations:—'The hypophosphite of lime increases the appetite, regulates digestion, prevents night-sweats,

whether partial or general, and hectic fever, and promotes sleep. When menstruation was not suppressed, but had become irregular, it generally returned to its normal state.' Even in the third stage, when the excavation was small, Dr. Galvez saw an improvement in the general symptoms, but only in some few cases, when there were several excavations, or when they were of considerable extent, did he note considerable improvement in the signs furnished by auscultation and percussion (155, 165). Dr. Galvez mentions that, after too large a dose of hypophosphite, the breathing became impaired, and if the remedy were not immediately stopped, patients were seized with hæmoptysis (131, 173). One of these died of an accident of this kind. Dr. Galvez remarked, that in cases where the softening of the tubercular matter was not far advanced, patients were able to take larger doses of the remedy than when softening was completely established or cavities were already formed. For this reason in advanced cases the treatment should be used in smaller doses. Dr. Galvez adds that these are the conclusions drawn from a large number of cases, and that they entirely agree with those of Professor Leriverend. (See Appendix III., Cases 41 to 44.)

J. G. Campbell.

177. Dr. J. G. Campbell ('New York Medical Press,' January 14, 1860), speaking of *his own case*, says:—'Shortly after using the hypophosphites I found a great increase of strength, slept well at night, and ceased to suffer from night-sweats. My appetite also improved very much. In five weeks my weight increased from 147 lbs. to 161 lbs., rather more than my weight when in health. The only unfavourable effect produced by the treatment was bleeding at the nose (131) and a return of hæmorrhoidal flux (132), which I had not suffered from for twelve months previously.'

178. Dr. Heslop, in a first communication to the 'Medical Circular,' February 8, 1860, says:—'I have

treated several cases with the hypophosphites with such marked success in the early stages of the disease, that I am satisfied it is a remedy of very great power.' In a further communication (March 14, 1860), the same practitioner states, that 'he has prescribed the hypophosphites in twenty cases at various stages of the disease, and that he has generally found in each case the following effects:—Great increase of appetite, increase of animal heat, marked improvement in breathing power, marked diminution of expectoration in every case, increase of weight and strength' (118—122. See Appendix III., Cases 46 to 48).

179. Dr. Dickson ('Medical Circular,' March 14, 1860) says that he tried the hypophosphites in thirty cases in *every stage* of the disease (165). In two-thirds improvement was very marked. Dr. Dickson specially noted their power of checking night-sweats. He states that 'he requested several medical friends to try the treatment on their patients, and that the results were *most extraordinary*' (466).

180. Dr. Denobele, Physician to the Prisons in Ghent, tried the hypophosphites upon sixteen prisoners ('Archives Belges de Médecine militaire,' t. xxiv. 1859). All these patients were in the second or third stage. He says the first effects were produced on the nervous system. There was less languor, more life and activity. In a few days sanguification improved, colour of the face much better, increase of animal heat, stronger and somewhat more frequent pulse, digestion, which was languid in most of these patients, generally improved, and assimilation was evidently much better, as was shown by the increase of weight (118—122): out of sixteen patients, eleven gained in weight. The increase varied from 2 lbs. up to 10 lbs. In one the weight was stationary, and one lost weight while under treatment, although the final result is stated to have been satisfactory (139 A). Dr. Denobele Denobele.

noted that in several cases the night-sweats decreased or entirely ceased, and that the expectoration was considerably diminished. But in several cases there was hæmorrhage following upon a notable increase in the animal heat, and in the frequency and fullness of the pulse (131, 132). The treatment was not continued to the end, as the stock of hypophosphites in the prison was exhausted.

Feldman and Pfeiffer. 181. Drs. Feldman and Pfeiffer, physicians to the Dispensary of the German Benevolent Society in Paris, made the following statement in a report presented to the Society ('Dispensaire de la Société allemande de bienfaisance,' 'Compte Rendu' du 1er Juillet, 1858, au 1er Juillet, 1860, pp. 28–30: Paris, 1860):—'It is now established beyond doubt that by a proper use of the hypophosphites *surprising* results may sometimes be obtained. We ourselves have usually acted upon the assumption that consumption was curable even in its diathetic or constitutional form' (15, 17, 42, 67, 68). 'By not despairing even in advanced cases we have prolonged the life of many unfortunate patients, and enabled many individuals to return to their work who would have been thought to be very near their end.'

John Taylor. 181 A. Mr. John Taylor (in a series of papers published in the 'Lancet,' November 30, and December 14, 1861) notes among the effects produced by the hypophosphites from a set of tabulated private cases, and from others in the Liverpool Workhouse and Royal Infirmary, increase of appetite and cheerfulness, of animal heat, and nervous force, of the red globules of the blood, and he speaks of them as controlling expectoration, night-sweats, and diarrhœa (118—121). Unfortunately Mr. Taylor prescribed, in cases of consumption, the hypophosphite of potash, which, as we have seen (101), has a disintegrating action. Nevertheless, his testimony to the general effects is very decided, and he mentions cases of extreme debility from cavernous abscess in the lungs and profuse expectoration, wherein æther and opiates were barely retaining life, and where the administration of the hypophosphite of potash produced a *magical* effect, invigorating the muscles, so that the chest could be fully expanded, the lost power of walking was restored, the cough suppressed, sleep induced, and the expectoration much diminished (136—150).

Mr. Taylor's practice fully confirms the general action of the hypophosphites on the system, to which I have already frequently alluded, and to which I shall again refer further on. He specially mentions their beneficial action in cases of pregnancy, prolonged lactation, troublesome dentition, some forms of dyspepsia, anæmia, catarrhal and leucorrheal discharges, and muscular pains simulating inflammation (237). In reference to the contradiction my views had met with, particularly at the Brompton Hospital, Mr. Taylor, after noticing the fact that in solution a large portion of the hypophosphites is oxydized during evaporation, adds, 'It will not now be difficult to understand why one practitioner makes two grains his maximum dose, another five grains, and another one drachm (60 grains). I do not hesitate to affirm that 60 grains of pure hypophosphite of potash or soda taken at once will produce poisonous effects, and if so, the hospital reports already published of experiments with such large doses of the hypophosphites are altogether valueless' (463). Unfortunately Mr. Taylor, instead of scrupulously following out the rules of treatment which I had laid down experimentally, decided *not* to act in contravention of the time-honoured practice of complicated formulæ, so that he prescribed not only the basis, but added to it the *adjuvans*, the *corrigens*, and *constituens*, and for this purpose usually exhibited along with the hypophosphites creosote, æthers, morphia, vegetable alkaloids, gentian, ammonia, liquor arsenicalis, and such mineral salts as do not produce decomposition, as iron,

&c. This was the reason why Mr. Taylor's experiments were not followed by the curative results, which otherwise might have been obtained. But his testimony as to the physiological action of the remedy remains unimpaired. Like many others, Mr. Taylor says that he did not believe, as asserted by Dr. Churchill, that the hypophosphites can cure phthisis in *all its stages*, omitting the indispensable limitation, 'provided the local lesions are not already so far advanced as to be incompatible with life' (59—85).

Vintras. 182. Dr. Vintras, physician to the French Hospital in London ('Lancet,' September 5, 1863), has reported four cases which were selected, not because they are the only satisfactory ones, but because '*they appear conclusive.*' In a first case, that of a child with a cavity and purulent expectoration, after seven months treatment the patient had become quite fat and healthy looking, her cough had ceased; she was seen several times afterwards, when her health appeared very good. In another case, in the second stage, with weakness, hæmoptysis, incessant cough, abundant spitting, night-sweats, sleeplessness, and absence of catamenia, dullness on percussion, and large crepitant rhonchi, the patient after three months treatment was quite well, had no cough at all, slept well, and the catamenia had returned. In a third case, the patient had spat a large quantity of blood, and suffered from night perspiration, troublesome cough, copious expectoration, and great thirst. When first seen by Dr. Vintras, he had been in bed three weeks, and a brother physician thought that the patient could not live a fortnight. There was great emaciation, flattening of the chest, and a large cavity at the apex of each lung. *Three days after* having begun the treatment, he told Dr. Vintras that 'if he continued to improve daily as much as he had already done, he should be able to resume his occupation in a week' (118). The improvement continued for a month. He could sit up for several hours in the day, and walked about the room. But he went out, without permission of the physician, to see a friend, and *overtired* himself (166), took to his bed, and never left it, though he lived for two months. 'In this case,' says Dr. Vintras, 'I think the immediate effect of the phosphide salt is undeniable, and verifies the statement of Dr. Churchill, that "from the very first day there is frequently observed a remarkable increase of nervous power."' Another patient had suffered from a cough for nearly two years; had had hæmoptysis several times, night perspirations, no sleep, no appetite, had lost flesh, and become very thin and weak. She had softened tubercles at the top of both lungs. Ten days after the beginning of the treatment there was an improvement. Ten days later cough and expectoration had much decreased, and two months after beginning the treatment she was able *to go to a ball*, and catch cold. Four months after the beginning of the treatment she had no cough, no perspiration at night, and the catamenia were regular. At the end of six months, from the commencement of the treatment, she had no unfavourable symptoms, and expressed herself as being quite well. 'This patient,' says Dr. Vintras, 'had been ill for nearly two years, and under the care of several medical men. She had taken all sorts of medicines without any benefit. The disease was progressing, in spite of treatment, until she took the hypophosphites; after using this remedy for four months, she felt so much better that she considered herself well.' (See Appendix III., Cases 52 to 55.)

183. Dr. Berchon, of the French Imperial navy, President of the Government Board of Health at Pauillac ('Gazette des Hôpitaux,' September 8, 1865), after having attended and watched the cases at my dispensary, Rue Larrey, for several years, expressed himself as follows:— 'For several years past we have followed the treatment of a great number of patients, who have been taking the Berchon.

hypophosphites, particularly at Dr. Churchill's dispensary, Rue Larrey, and we can state that in the extensive series of experiments which he has been carrying out since the reading of his first paper to the Academy of Medicine, he has rigorously followed the rules of modern observation.' After giving an account of the second edition of my French book, he proceeds thus: 'Dr. Churchill states that pulmonary phthisis is always curable by means of the hypophosphites under *certain ascertained and determinate conditions*; an assertion of this kind requires to be based upon serious and complete proof, and we think that will be found by the reader in the chapter in his book, which contains full reports of the cases treated at his dispensary, and which form the groundwork of the superstructure he desires to raise. One hundred and thirty-seven clinical instances, including not only the cases of success or half success, but the failures also, constitute the elements of a statistical series, such as we seldom meet with in our day, and we do not think it possible that any experiments could have been carried on with greater conscientiousness and accuracy, or more completely in accordance with the legitimate requirements of science, than the series which the reader will find in the first half of the book under review.'

Bougard. 184. In the year 1865 Dr. Bougard, Vice-President of the Société Royale des Sciences naturelles et médicales de Bruxelles, in a report on my book read before the Society, says:—'The results obtained by Dr. Churchill surpass everything which has hitherto been done against the fatal disease which is the subject of his work; our own personal experience and that of any one single member amongst us would be insufficient to lead to a decisive settlement of the question he has raised, but the united experience of the whole of us might perhaps decide this important point in therapeutics. I therefore appeal to your testimony, and will set the example by bringing forward my own collection of facts; I will only mention three which were in a favourable condition for the use of the hypophosphites.' These cases of Dr. Bougard's, which are reported very concisely, will be found in Appendix III., Cases 56 to 58. In the first there was rapid improvement followed by a cure, which had then remained permanent for two years. In another case, the improvement had then been permanent for one year. In the third case, the patient was in a fair way of recovery. According to his report of these cases, under the influence of the hypophosphites the cough diminishes, the appetite increases, the strength returns, the night-sweats disappear, and the patient enjoys a feeling of comfort to which he has hitherto been a stranger.

Dr. Bougard adds :—'I have prescribed the hypophosphite of soda in other cases of confirmed phthisis, but the disease was in these cases in too advanced a state to allow me to conclude that my failure was owing to want of power in the hypophosphites.' Following upon this report, the Society voted unanimously that Dr. Churchill should be elected a corresponding member.

Tirifahy.

185. In reply to Dr. Bougard's appeal to the members of the Société Royale des Sciences naturelles et médicales de Bruxelles, another member, Dr. Tirifahy, read a paper before the Society in August of the same year, in which he gave the result of the treatment of forty-two cases. These will be found in Appendix III., Cases 59 to 100. In Dr. Tirifahy's cases the treatment produced the usual effects already mentioned—return of strength, sleep, and appetite, increase of breathing power, decrease and final disappearance of fever, cough, night-sweats, and expectoration.

The reader who will carefully go through Dr. Tirifahy's cases will note in several instances a confirmation of the statements I have already made. For instance, he will find that in several instances, when both lungs were affected, *the least involved of the two was completely healed*

(152, 164). Such, for example, are cases 9, 12, and 13. Another case, No. 10, shows how the local condition of the lung may go through its natural evolution in spite of the improvement of the general condition (155, 156). The same remark applies to case 14. In many of these cases, as will be seen, there were extensive and serious complications. Other cases again of Dr. Tirifahy's, such as 23, 24, show how important it is to keep the patient for a sufficient length of time under the influence of the hypophosphites, and how prematurely leaving them off may entail a recurrence of the disease (169). Some cases also, such as No. 27, would appear to indicate that the action of the hypophosphites was occasionally interfered with by the use of other modes of treatment (205—215.) In four cases 29, 30, 31, 32, where it is said that the patients seemed to feel no effect whatever, either good or *bad*, from the use of the hypophosphites, it is necessary to remark that Dr. Tirifahy does not state whether his attention was directed to two very important points, first, whether the patients really took the medicine, and secondly, whether he was certain that the hypophosphite used was pure (87, 91, 92, 93). In the last ten cases from 33 to 42 inclusive, the use of the hypophosphite of lime was followed by an aggravation of all the symptoms, indicating, says Dr. Tirifahy, that 'the suppuration and ulceration of the lung were made more active.' Dr. Tirifahy states that he gave his patients at least fifteen grains a day. This confirms what will be stated farther on, as to the necessity of small doses in *advanced* cases, and to the preference which then should be given to the hypophosphite of soda (104, 200).

Dr. Tirifahy says that he was particularly struck by the great improvement in the appetite and activity of digestion, which was shown even in the first few days (118, 182). He also found there was great increase of hæmatosis and nutrition, 'What was very remarkable also,' says he, 'was the improvement in the facies of the patients, which, instead of being thin and drawn in, as is usual with consumptives, assumed such a look of fulness that I thought it must be owing to the intercurrence of "Bright's Disease," until I found the contrary by the analysis of the urine' (121, 130). Dr. Tirifahy concludes as follows, 'From these facts it results that the hypophosphite of lime has proved efficacious against pulmonary phthisis. I am far from thinking this remedy a "specific" for this formidable complaint, but it is nevertheless certain that the number of cures I have obtained must excite the envy of every other mode of treatment; I therefore recommend the use of the hypophosphites in *every* stage of the complaint' (165).

Further on, when I come to consider what is really meant by the action of a 'specific,' I shall show that if Dr. Tirifahy, as well as several other physicians, hesitates to conclude in favour of the specific action of the hypophosphites, their faltering arises from the nonsensical jargon current upon this subject, and from the present utterly unscientific condition of therapeutics (228—239).

186. In December 1865, Dr. Henri van Holsbeck made the following statement in the 'Scalpel,' which I consider a testimony of the greatest weight in favour of the hypophosphites, and which does him the highest credit both as a physician and as a man. It is to be regretted that other practitioners who are in the same case as Dr. Van Holsbeck, have not shown the same manly outspokenness. 'In 1858,' says Van Holsbeck, 'in a paper on consumption among journeymen printers which I published in the "Journal de Médecine de Bruxelles," I had made the following statement: "I have tried every known means in their case, including Dr. Churchill's hypophosphite of soda, and I have never seen a single real cure;" at the present time I feel bound in the interest of truth to declare that since that period I have

Van Holsbeck.

been in the habit of prescribing the hypophosphites in my daily practice; I have already registered several radical cures obtained by the use of this valuable remedy, which almost always produces very great improvement. I am now bound to acknowledge that the hypophosphites have an undoubted action in the cure of phthisis.'

The great importance of this statement consists in this, that it shows, beyond a doubt, that the success or failure of the treatment depends upon the skill of the practitioner, and his experience in the use of the remedy, Dr. Van Holsbeck is not ashamed to confess that it took seven years to complete his conversion.

Thorowgood. 187. Dr. Thorowgood, M.D., London University, Member of the Royal College of Physicians of London; Physician to the City of London Hospital for Diseases of the Chest, Victoria Park; late Physician to the Royal General Dispensary; and Professor of Materia Medica at the Middlesex Hospital School; published a series of papers in the 'Medical Mirror' for 1864, which he has since reprinted, with large additions, in a separate form, ('On Consumption and its Treatment by Hypophosphites' 2nd ed., London, 1868). Dr. Thorowgood states that the effects produced by the use of the hypophosphites in his hands are great improvement; less pain in chest; improvement in the breathing, much improvement in the physical signs (in one case the patient stated that she felt a 'new being'); improvement in cough and expectoration; improved appetite, cessation of diarrhœa (136—150). In several cases where the hypophosphites were omitted and other medicines substituted, there was a marked aggravation of symptoms while there was a return of improvement when the hypophosphites were resumed (169). Dr. Thorowgood's first series of cases consisted of 115, treated partly or entirely with the hypophosphites; of this number he states that 20 were most decidedly and permanently benefited by the use of the hypophosphites of soda and lime. Five of these were in the third stage with cavities, and the other 15 in the second stage, the respiration showing moist sounds varying in extent and degree. Besides these 20 cases, in 34 others where the evidence of the disease was very decided, great relief was gained from the hypophosphite treatment, more, perhaps, than by any other medicine employed. Dr. Thorowgood goes on to say (p. 17), 'In cases of advanced phthisis with cavities in the lungs, I have seen *wonderful* relief obtained in dyspnœa by the hypophosphite of soda. One young man, who when first seen could not walk one mile, after two months' treatment walked one day twelve miles, as he himself told me; his lungs were both extensively diseased; he lived in a very close locality, and eventually sank under his disease, but the benefit that ensued for a time under the medicine was very great' (64, 155, 166).

One reason of Dr. Thorowgood's greater success as compared with that of other English practitioners was, no doubt, due to the fact of his frequently using my own preparations as made by Swann of Paris. Some of his failures, I have no doubt, were owing to his not having always done so, some to his prescribing the hypophosphites combined with other remedies, such as camphor, columba, glycerine, alkalies, and above all, iron and cod-liver oil (205—214). Allowing the use of alcoholic stimulants no doubt also had a very great share (210).

In a second edition of his book, Dr. Thorowgood expresses himself as follows (p. 19):—

'Increasing experience in the use of the hypophosphites of lime, soda, and quinine, in the treatment of pulmonary disease, has afforded me results that I feel bound to regard as both favourable and encouraging. The question now is exactly to ascertain under what conditions of individual constitution and local pulmonary disease the curative effects of these hypophosphites are best displayed, for it must be remembered that a medicine becomes a remedy in proportion to its judicious, and well-chosen application' (59—85).

He goes on to state, p. 20 :—

'Having now been in the habit of using these medicines pretty frequently during the last five years, I am able to say that my faith in their remedial power becomes more and more confirmed, while I recognize the fact that these hypophosphites require to be given with *discrimination and care* ; otherwise, not only no benefit, but even actual mischief will result from their administration' (59, 158, 231).

Dr. Thorowgood's second series of cases amounted to 158.

'Of these,' he says (p. 31), '100 were set down as "phthisis first stage," which means that each presented some notable physical sign in the way of dulness, jerking or uneven breathing, with prolonged expiration, and many of them had cracklings to a limited extent audible in one lung.

'Of these 100 patients 44 were very much relieved and able to cease attendance and return to their employments; in the cases of 16 hæmoptysis was noted, but only in those cases where it formed a prominent feature in the symptoms. In my note-book, far the majority of these 44 cases end as "discharged cured" (153, 154). Forty-seven others seemed to get some relief and benefit from the hypophosphite treatment; in 15 of these hæmoptysis was noted. In 9 cases no benefit whatever resulted either from the hypophosphites or anything else. They were all cases of phthisis ; 3 had hæmoptysis, and, a noteworthy feature in all these nine cases, there was great tendency to gastric irritation (171 B).

'Of 58 cases where the disease was in the second or third stage, there were 8 that might be called real cures ; 2 of these had decided vomicæ, and these were brought into a quiescent state. In the other 6 cases breathing remained very feeble in both lungs (154, 155). Twenty-three others were set down as "much relieved;" 15 as "relieved;" 7 got no good whatever; and 5, to my certain knowledge, died. Such are the results which I find to come out from going over the notes I have been able to keep of these hospital out-patients.

'The cases in which the hypophosphite of soda answers best as a remedy, appear to be those where there is no tendency to gastric irritation or diarrhœa. The physical signs that are best met by the hypophosphite are those of slight congestion at the lung apex, with tubular breathing and humid clicking or crackling. Slight hæmoptysis does not, in my experience, interfere with the administration of the hypophosphite.

'Where obvious dyspepsia or bronchitis from recent cold are prominent symptoms, they must be treated in the usual way, for at such a juncture the hypophosphite is not of much use (158).

'The hypophosphite of lime is good when there is profuse expectoration; also it is of use when diarrhœa is troublesome (104).

'The hypophosphite of quinine is best given in pills, as prepared by Swann, of Paris. I have met with it as a bitter powder, becoming a gummy resin when warmed; but the pill is certainly the best form in which to administer this remedy (107).

'Though generally I prescribe the powdered hypophosphite made into a mixture, with syrup and camphor or mint water, yet I have also used the ready-made syrups of the hypophosphites. These, prepared after Dr. Churchill's own formulæ, by Swann, of Paris, are excellent preparations.

'For my own part, I rarely exceed one drachm as the dose of these syrups three times a day; but some of my friends give them in larger doses. Dr. Mitchell, of New

Cross, tells me that he has found most satisfactory results from one tablespoonful of Swann's syrup of the hypophosphite of lime in cases of *most pronounced* phthisis; the patients have *not been able to be* without the medicine, so marked has been the relief afforded by its use (198).

'I cannot, from experience, say much about the syrup of the hypophosphite of iron, for I rarely use it, having the belief that it is a great stimulant to the circulation, and may therefore induce hæmoptysis.

'The hypophosphite of quinine, prepared by Churchill's process is an amorphous substance, the colour of honey, of the consistence of wax, deliquescent, and very bitter; and when warmed it burns like a resin. This is the preparation made into pills by Swann; that which I have met with in English pharmacy has been, as already stated, a white amorphous powder (107).

'My own experience entirely accords with that of Dr. Churchill as to the great utility of the hypophosphite of quinine in the early stages of phthisis; and I think with some satisfaction of the case of a young medical man, who is now strong, healthy, and active, while three years ago, he had cough, wasting, hæmoptysis, and all the signs of phthisis commencing in the upper part of one lung. The only remedy I prescribed in this case was the hypophosphite of quinine.

'In testing the powers of such remedies as the hypophosphites in consumption, it is well to take every legitimate opportunity of withholding other medications during the trial. Not infrequently, we are compelled to do this from the patient not being able to take cod-liver oil, and being nauseated by most of the mixtures that are usually given to consumptive people. It is in these cases that I have noticed very good results to follow from the administration of the hypophosphite, the disease appearing to be arrested in its progress, although the mischief it has done may remain and be very evident in a physical examination of the chest (152—156). These cases of progressive phthisis thus checked solely by one remedy, are interesting and instructive.'

Dr. Thorowgood says (p. 39): 'The hypophosphite of potash has been described in the early part of this book. As a remedy I do not often employ it; it must be used with very great caution, being a powerful resolvent of condensed and consolidated lung tissue; and if tubercles are present, it may cause these to soften with a rapidity that may be dangerous and alarming (101, 181 A).

'In some few instances of consolidation of lung from exudation, I have used this hypophosphite with great success' (101).—See Appendix III., Cases 102—128.

Dr. Thorowgood (p. 40) says: 'It must always be recollected in the practical use of the hypophosphites, that their sphere of action is to check the gradual invasion of the system by deposits of tubercle, and it is in the gradual development of phthisis in young growing people, coming of consumptive ancestors, where their remedial powers are most marked and most certain. This is a point on which my own experience enables me strongly to agree with Dr. Churchill' (59, 68, 151, 152, 165, 169). 'I may here remind my readers that these are the very cases in which something approaching as nearly as possible to a specific remedy, is so much wanted. It is, therefore, for the purpose of arresting the deposition of tubercle, and of eradicating the tubercular diathesis, that we are to have recourse to the hypophosphites; hence to ensure anything like success we must be careful and exact in our diagnosis' (161, 162).

'Very often I have seen active consumption in its third stage arrested by means of the hypophosphite of lime, cavities existing in the lungs becoming quiescént for months, or even years, and the general health improving greatly. A phenomenon often noticed and often referred to in these cases by the patients, is their great breathlessness; they feel well, they say, "but for the breath." This harassing dyspnœa, I have now recognized as one of the phenomena of phthisical convalesence, when the destruction of lung tissue has been extensive. Dr. Churchill has referred to the same point, and has had patients in whom advanced phthisis had been arrested, come again to consult him solely on account of the distressing dyspnœa (64, 157).

'Since our attention is now resting on the treatment of advanced phthisis, I would here draw attention to a matter of no small importance, when observing a case with quiescent cavities in the lungs. It is this—not to mistake inflammatory action set up by cold, or any other exciting cause, in the wall of the cavity, for an extension of the tuberculizing action in the lung, demanding renewed administration of the hypophosphites (168, 169).

'If this mistake be made, it will be found that the hypophosphite mixture will be of no more value than an equal quantity of salt and water administered to the patient (158).

'A few words now on the complications of phthisis and the extent to which they interfere with and influence the curative action of the hypophosphites.

'*Hæmoptysis.*—A slight amount of spitting of blood need not oblige us to suspend the action of the hypophosphite, if in other respects its effect seems good (74). If, however, the hæmoptysis persists or seems to increase, then it is safest at once to stop the hypophosphite treatment. Dr. Churchill points to epistaxis as an indication that the system is saturated with the hypophosphite, and that it is time to stop its action. I have in a few instances had patients complain for the first time of epistaxis after they have taken the hypophosphite of soda for some time (131).

'*Diarrhœa*—Over the diarrhœa of advanced phthisis due to ulceration of the intestines, none of the hypophosphites that I have ever tried have had any curative action (78, 148). I do sometimes in these cases give the hypophosphite of lime, with bark, with some good effect. Here, however, I believe the benefit is due more to the bark than to the hypophosphite. In the diarrhœa met with in the early stages of consumption, and at that time a very serious symptom, the hyphophosphite of lime is certainly of decided service (105, 107).

'*Vomiting.*—Where the stomach is irritable and vomiting a troublesome symptom, the hypophosphite of lime will often act beneficially (76).

'*Amenorrhœa.*—Often suppressed menstruation returns in a satisfactory way, while the patients are taking the hypophosphite of soda (81, 149).

'In the male, sexual debility and spermatorrhœa are influenced beneficially by the hypophosphites, but not to the extent I should myself have expected from what is said of the action of phosphorus itself on the sexual functions' (125).

Dr. Thorowgood further says (p. 44): 'From practical experience I am able to say that the age of the patient is of importance in determining the favourable nature of the prognosis to be given in any case. It seems the younger the patient the more favourable is the prospect of a real cure (69, 70). I am aware that we are all liable to errors of diagnosis in the chest affections of very young children, and also that often nature will come in and work a cure when the doctor has given the case up as hopeless; still, it is not only in the instances of those who are quite children, but also among those who are growing and in their "teens," that the hypophosphites act with a curative energy much more marked than in the instances of those more advanced in life. Here I find that my experience accords with that of Dr. Churchill (70, 169).

'I find that Dr. Churchill lays great stress on the establishment by degrees of a state of venous plethora in the system, as a sign that the full effect of the hypophosphite has been attained. If the administration of the drug be still persisted in, signs of disturbed innervation occur, such as vertigo, headache, dyspepsia, noises in the ears with more or less fever, and excitement of the system; a state of things highly dangerous for one who has phthisis with tendency to blood-spitting (121, 128—135).

'A tendency to a florid fulness of the face and to epistaxis are given by Churchill as the earliest signs of the system being saturated by the hypophosphite. This fulness and florid hue in the face is not always evident in those who are of a bilious or nervous temperament, but whenever it is observed, it is a sign that we should for a while pause in the use of hypophosphite (121). In some few instances I have noticed this fulness of the face, and also in a few instances I have had patients draw my attention to epistaxis, a complaint quite unknown to them before they had commenced taking the hypophosphite (134, 135). So far as my observation goes, neither fulness of face nor bleeding at the nose are by any means common or constant effects of the hypophosphites, but as patients do now and then mention one or other of these symptoms, it is well to be aware that they are to be expected at times.'

At p. 45 Dr. Thorowgood says: 'Time only will enable us to get reliable information on the deeply interesting question of the permanence of the curative effects of the hypophosphites. From what I have seen of patients whom I have treated three or four years ago, the permanency of the cures has in *numerous instances* been so remarkable that I have doubted as to whether I correctly noted the symptoms manifested by the patient when actually under treatment, and have questioned them as to their own recollection of their past symptoms' (153).

It will be noted in what precedes that Dr. Thorowgood, thanks to his more increased experience, confirms nearly the whole of my statements. Thus he has verified the necessity of not adding other medicines to the hypophosphites, the danger of using iron along with them, although he advises exceptionally the use of the hypophosphite of quinine and iron. He agrees with me that the result of the treatment depends upon the care and discrimination with which it is carried out. In several instances he noted the fulness and florid hue of the face, the epistaxis, to which patients themselves drew his attention, telling him that it was a complaint quite unknown to them before taking the hypophosphites. He confirms what I had said concerning the importance of the age of the patient in determining the prognosis, and that the younger the patient the more favourable the prospect of a complete cure. He has also seen that the curative energy of the hypophosphites is much more marked among those that are growing than among those that are more advanced in life. I am convinced that further experience will lead Dr. Thorowgood, as well as other practitioners, to conclude with myself, that many cases of failure in the use of the hypophosphites depend upon the fact that they have not been given *chemically pure*, and entirely alone, as they ought to be, except in cases where (205—219) some other remedy has been used temporarily against a complication, such as diarrhœa or very troublesome cough, and then only with a view of fulfilling a precise and positive indication. Dr. Thorowgood has shown himself the fairest and fullest expounder of my doctrines in this country, and is deserving of every praise for the trouble he has taken in collecting two extensive series of cases.

Prophylaxis.

188. If the specific action of the oxydizable compounds of phosphorus against the tubercular diathesis, as proved by the arrest or healing of the organic lesions, within the limits and under the conditions specified in what precedes, be once admitted, it follows that these pre-

parations, particularly the hypophosphites, constitute an assured preservative against consumption, as cheap and as easily administered as tea, coffee, sugar, or salt.

Since my discovery of their curative effects I have had constant opportunities of observing their action in delicate children, born of consumptive parents, and I feel bound to state that I have never seen *one* single instance of such children becoming consumptive, when the remedy has been used in a proper manner. Independently of this fact, I have demonstrated experimentally that the hypophosphites exert a special action in promoting the growth of children and of young animals (126), and thus show themselves to be the direct antithesis of that peculiar condition of weakness and low vitality which is one of the characteristic morbid features of the present physical constitution of most classes of the population, except the wealthiest, as has been observed by H. C. Richter ('Blutarmuth und Bleichsucht die verbreiteste Krankheiten der Jetztzeit,' Leipzig, 1850); by Pollitzer ('Die Blutarmuth, Bleichsucht, und ihre vorwandten Zustände als vorwiegender physischer Character unseres Zeitalters. Zeitschrift der Gesellschaft Wiener Aerzte,' 1857); and by Burggræve ('De l'Importance de l'Hématologie pour la Conservation de la Santé et la Prolongation de la Vie' 'Bulletin de l'Académie de Médecine de Belgique,' 1857, t. xvi. p. 693).

Degeneracy of town populations.

189. No observer can fail to be struck with the stunted and degenerate condition of most European town populations. This has gone to such an extent, that the solicitude of Governments has frequently been aroused on finding that the supplies of what is 'food for powder' were falling off. Both at home and on the continent the standard ot height required for army recruits is being lowered year by year. Here, in the hypophosphites, is a simple, easy, and efficacious means of saving from certain death one sixth of the populations of Europe, of drying up one of the chief

sources of the sufferings which afflict the working classes, of remedying the degeneracy of the human race. Was it presumptuous to hope that in the large centres of population and misery some philanthropic association, some public body, some medical society, would have hastened to subject a discovery of such paramount importance to the test of *fair and adequate* scientific experiment? Not only, with one solitary exception (184, 185), such has not been the case, but with my present experience, it would be puerile for me to expect it in our actual state of civilization, or to complain that it should not be so.

'Stamping out' of consumption.

190. It therefore only remains for me to do as I have been doing for the last seventeen years, to point out this aspect of my subject to the few men who are philanthropists in anything but name, and to show them that by the use of the hypophosphites as an *occasional nutriment*, we now possess an assured means of keeping up the health and vigour of the working classes, of the lower strata of the middle classes, of prisoners, of underfed children, of all who are of weakly constitution, all who are condemned by circumstances to labour beyond their strength, or who suffer from insufficient food. By means of the hypophosphites, not only might phthisis and all the forms of tuberculosis, be stamped out as surely as small-pox has been by vaccination, but what is better, the proximate cause which produces them may be destroyed by preventing that state of weakness and etiolation, which is too frequently the starting point of the complaint.

Hypophosphites antagonistic to drinking

190 A. The use of the hypophosphites would also do away with that feeling of weakness and exhaustion (370—374) which impels to the use of alcoholic beverages, and thus directly counteract a cause of depravity and suffering which has baffled the efforts both of religion and of morality.

Rules of treatment

191. From what precedes it will be easy to deduce definite and accurate rules of treatment. The use of the

hypophosphites being followed by an increase of the functions of innervation, sanguification, and of nutritive power, this fact should never be lost sight of by the practitioner.

Time a condition. 192. By keeping it in view it becomes easy to understand how preposterous it is to expect, as is done by some practitioners, that a remedy, which acts through the function of nutrition by promoting the building up of new and healthy tissues, and by eliminating those which are diseased, should in all instances, even in the most advanced cases, manifest its action in the course of a few days.

When the lungs are only slightly affected, or when the disease is of recent origin, this early and immediate action will often be met with (182, 187). Such, for instance, is the case in acute phthisis. Otherwise when the local disease is extensive, or has already lasted some time, the action of the remedy must be chronic like the complaint itself.

Physiogenic limit. 193. The *first* rule is to administer the hypophosphites so as slowly to produce the physiogenic effects already specified, and carefully to watch that the action of the remedy should not enter the sphere of pathogenic phenomena (118, 128).

Duration of treatment. 194. The *second* is to keep the patient in this condition as long as may be necessary to obtain the elimination of the morbid deposit by one of the modes already pointed out (151—156).

Treatment of complications. 195. The *third* is to combat by appropriate means, the consecutive or accidental complications which exist, or may show themselves during that time (71—84).

Dose. 196. From what I have already stated it is evident there is no fixed or invariable dose. Originally I was in the habit of prescribing for men from five to fifteen grains daily. Longer experience has led me to reduce the dose. Instead of beginning with five grains a day and gradually increasing up to fifteen, I now usually begin with one grain a day, and seldom go beyond six or seven.

197. My syrups of hypophosphite of soda and lime, as prepared by Swann, of Paris (112), contain five centigrammes (one grain English) to the teaspoonful; a dessertspoonful contains one-and-a-half grains; and a tablespoonful three grains; so that the doses are from one to five or six teaspoonfuls, or from one teaspoonful to one tablespoonful and a half, or three dessertspoonfuls daily. By using small doses at first, the *therapeutic or medicinal* effects are less marked, less brilliant, than with larger doses, but the pathogenic effects are altogether avoided. For females the dose is generally about one half of the above. For children, from seven to fifteen years of age, the dose may usually be from one to two teaspoonfuls, or grains, per diem. Below seven years of age the dose should be from one-fifth of a grain to one grain daily. In children below two years of age, the dose ought seldom to exceed one-fifth of a grain, and should be omitted at least every second or third day. To give one-fifth of a grain when using the syrups, it is only necessary to mix one teaspoonful of syrup with four of water, and to give one teaspoonful of the mixture. The syrup of hypophosphite of iron contains only half the quantity of salt, contained in the other syrups, that is to say, a teaspoonful contains about half a grain, a dessertspoonful three-quarters of a grain, and a tablespoonful one grain and a half. The doses may be the same as for the other syrups. The pills of hypophosphite of quinine and hypophosphite of manganese each contain one grain of the salt.

My hypophosphites.

The syrups are perfectly free from any medicinal taste, and may be taken either pure or mixed with a little water, or with any of the patient's usual beverages, such as milk, tea, coffee, etc. This does not apply to the syrup of iron, which should never be mixed with anything but water. The best time for taking them is immediately before or after a meal, particularly the breakfast.

Gradual increase of dose.

197 A. There is very great variability in the immediate effect produced upon different patients. The physician should, therefore, carefully feel his way, increasing the dose every second or third day until some apparent effect is produced either upon one, several, or the whole of the symptoms. When once this has been obtained, and the treatment has been continued for about a week, it will often be found advisable to omit the treatment for one or two days, and see how the patient fares without it. After this it should be resumed, either in the same or in a smaller or larger dose, according to the indications presented.

This interval may be gradually increased with the improvement in the patient's health, and his showing signs of physiogenic plethora. When all the general symptoms (weakness, emaciation, &c.) have disappeared, and nothing remains but those depending upon the local condition, such as cough, expectoration, &c., two or three doses, sometimes even only one dose a week will be found sufficient to keep the patient in the state of physiogenic plethora necessary for the completion of the cure.

But, as already said, this will vary with every individual case. Some patients require a daily dose of three or four tablespoonfuls, and cannot do with less; others feel better with even a smaller number of teaspoonfuls (116).

Prophylactic doses.

198. When the cure is once complete, when the local lesions have disappeared, or have cicatrised, the patient should continue to take one or two doses a week as a prophylactic. Many patients find they cannot leave off the treatment altogether for a longer time than three or four weeks without feeling the want of it, and getting below *par*, particularly if they remain in the same hygienic conditions (such as over-work, &c.) as those which originated the complaint. I have even met with some

who could not leave it off for a single day without feeling the want of it.

When there is only a predisposition without any disease, either actual or antecedent, the doses will be the same, but may be less frequent.

198 A. The main principle to be followed is to keep the remedy within the physiogenic sphere of its action; to leave it off for a time, if there should be any pathogenic effects, but in *no case, on that account, to abandon it altogether*.

Precautions.

199. In all cases the following precautions will have to be observed. If tuberculosis depend upon the want of the oxydizable phosphorus in the system, it is clear that the introduction and assimilation of the hypophosphites will supply this want, but, as will be seen further on (268—291) this phosphorus does not exist in the organism in an isolated or free state. It is only one, although the most important and characteristic, among several other principles which unite to make up the oxydizable phosphorized compounds. These other elements must be provided by the organism, must combine with the new element medicinally supplied, and the resulting compounds must be built up in the system itself. This is a process of reconstruction, which depends, it is true, upon the presence in the system of the elements required, without which it cannot take place, but which is influenced by the activity of other functions, and above all by those of assimilation, respiration, and sanguification. Now each of these three different functions may vary, and does vary, in every individual, so that even should the phosphorized element be always supplied in the same quantity, it will not be worked up in all cases with the same amount of activity. It is evident, for instance, that a patient, in whom the appetite or digestive function is impaired, will take less nutriment, even if he takes the same amount of phosphorus, and consequently build up

less of the principles containing the phosphide element than one in whom the digestive functions are sound. The same will be the case when the lungs are seriously damaged, and the respiratory power considerably impaired. Here the activity of sanguification will be diminished, because all the elements of nutrition supplied by the digestive process must first pass through the lungs, and be sufficiently oxygenized before they become completely incorporated in the blood, and are, so to speak, adopted by the system.

Gradual action.

200. It follows from this that the improvement of a consumptive patient under the hypophosphites should be slow and gradual. The more advanced the disease, the more gradual should be the improvement, and the more serious will be the induction of pathogenic symptoms. This last circumstance is the more important, because the existence of a relative state of plethora is the prime condition of cure; but it is also at the same time a predisposing cause of hyperæmia of the lung tissue surrounding the tubercular matter, consequently of inflammation and of softening of the tubercular deposit. I have often seen cases in which the use of excessive or too prolonged doses of the hypophosphites by an inexperienced physician has brought on rapid softening of the tubercular deposit, and a fatal issue in patients, who shortly before had appeared in a fair way of recovery under the treatment.

Precautions against hæmorrhage.

201. When there is any predisposition to hæmorrhage the action of the specific should be carefully watched. This, however, is not a counter-indication to the use of the hypophosphites. It frequently happens, on the contrary, that the tendency to hæmorrhage disappears under their influence, particularly when it depends upon the diathetic and spanhæmic condition, that is, upon the want of plasticity and vitality in the blood. I have published several cases in support of this view, which has been since confirmed by other observers (187).

In cases of hæmorrhagic predisposition, however, there is greater danger, should the action of the remedy be allowed to reach the pathogenic stage. In the early part of my practice I lost several cases on that account, frequently owing to the imprudence of the patients themselves, who thought they *could not take too much of a good thing.* Since then I have been fortunate enough to avoid such results by the use of smaller doses, by being careful to put such patients specially on their guard, and by having immediate recourse to pyrogallic acid (75).

Over-drugging.

202. As I have seen cases of softening induced by overdoses of the hypophosphites in the practice of other physicians (200), so likewise I have either known of or have witnessed attacks of hæmorrhage, evidently owing to the same cause, or to the concurrent use along with the hypophosphites of cod-liver oil, or of iron; sometimes to the injudicious preference to the hypophosphite of soda or lime of the hypophosphite of iron, or even of free hypophosphorous acid on account of their greater activity; to the over-excitement of the circulation by stimulating liquors, or, lastly, to the use of a heterogeneous jumble of different hypophosphites; oftentimes, alas! for the poor patient, to a mass of powerful therapeutic agents dished up together.

At this moment of writing I know of a consumptive child, nine years of age, who has been ordered to take, every day, a tablespoonful of syrup of hypophosphite of iron, a large dose of cod-liver oil, a powerful tonic, and a glass of port-wine. What a pity that practitioners who can write such prescriptions should not have at their disposal a hypophosphite of gunpowder.

Homœopathy.

203. It were much to be wished that physicians of the orthodox school would take a leaf out of the book of their heterodox brethren, the homeopaths. I neither admit the validity of the doctrine of similars, nor that of the potential energy of the dynamization of medicines.

But it would be difficult to overrate the benefit that has been done to medicine by homeopathic practitioners; first of all by the simplicity of their prescriptions; secondly, by the methodical, and often over-fastidious minuteness with which they have registered therapeutic appearances. To suppose that all this is a sham, is casting at them a reproach which may easily recoil upon ourselves. The doctrine of 'similars,' though only a partial and incomplete view of therapeutical action,is fully entitled to as much consideration and respect as nine-tenths of the doctrines which, at one time or other, have passed current in medicine, or actually do so at present. The increased potency produced by dynamization may be as great a myth as the existence of a vital principle. There can be no doubt, however, that medicines do act in doses wonderfully smaller than is generally supposed, and, as I have shown when describing the effects of the hypophosphites, their *therapeutic* and *curative* action may be either induced, disturbed, or altogether counteracted by the amount of the dose which is given (116--135). When speaking of therapeutics, we might copy the words used by Chancellor Oxenstiern, when speaking of politics: 'See, my son, how little wisdom it requires to govern mankind.' So may the modern physician truly say, 'See, how little medicine is required to cure—or kill a patient.'

Variable manifestations of specific.

204. Let us examine successively two different kinds of results which may follow upon the use of the hypophosphites. Supposing that the primary condition, that of the purity of the remedy, has been secured, and that in order to enjoy complete assurance upon that head, the patient makes use of my syrups as prepared by Swann of Paris, it will follow either that there is an improvement, or that there is none.

I find that when an improvement does take place, the first signs of it usually show themselves more or less during the first week. Sometimes the patient notices it from the very first day (182, 187). It is seldom delayed beyond a fortnight, though in some exceptional cases I have known it not to become apparent till after the lapse of as long a time as six weeks. We must not, therefore, despair of the remedy, if its action be not immediately manifest. Sometimes the improvement is apparent for all the symptoms at once; sometimes only for some; at times for a single one only. The appetite is sometimes the first function to improve. At other times it is the strength, or it may be the cough, or sleep, or perhaps fever. The younger the patient (69, 70) and the more recent the disease, the shorter the time usually required for the first appearance of improvement. But there may be a mistake in reckoning the duration of the complaint: this should not be dated from the time the patient began to think himself ill, or perhaps to take alarm; but from the time the cough, or occasionally hæmoptysis *first* appeared.

205. In cases where no improvement has shown itself within the lapse of time I have mentioned, it will generally be found that this is owing to some one of the following causes.

Drugs incompatible with specific.

205 A. Along with the hypophosphites the patient is perhaps taking some other medicine or medicines, which counteract or destroy their effects. Most of the drugs used against phthisis are altogether incompatible with the hypophosphites.

Alkalies—mineral waters.

206. For instance, if along with the hypophosphites, the patient is taking alkalies or mineral waters, there will generally be a persistence or an increase of cough, of expectoration, of night-sweats, and of fever.

Sulphur.

207. If preparations of sulphur, or sulphuretted mineral waters are used with the hypophosphites, there will often, besides these effects, be spitting of blood.

Iron.

208. Iron, and all its preparations, as well as all the mineral waters, which contain it, should be most

rigorously excluded from the specific treatment by the hypophosphites, unless it be in some rare and exceptional cases; otherwise, instead of an improvement there will be an increase of fever and of weakness, and, sooner or later, we shall inevitably bring on congestion of the lungs, and spitting of blood (109, 187).

Arsenic and metallic salts.

209. Arsenic, which is frequently prescribed against phthisis, almost entirely destroys the beneficial action of the hypophosphites. It prevents the return of strength and appetite; increases cough and fever, and induces indigestion and diarrhœa. The same remark applies to all metallic salts in general.

Alcoholic drinks.

210. All alcoholic stimulants—strong wines and beer, which are so often prescribed in cases of consumption, produce similar effects. They prevent the return of strength, and bring on a recurrence or an aggravation of cough, fever, and sleeplessness. As their effect upon the system consists in a stimulation of the circulation, and a diminution of oxydation, it is directly contrary to that of the hypophosphites (360). Their use is to be more especially deprecated whenever there is any acceleration of the circulation, either owing to hectic fever, or to intercurrent inflammation, whether this latter be accidental or dependent upon softening of the tubercular matter. The patient must be restricted to the use, at most, of very weak claret and water; but it is even better to avoid fermented liquors altogether, and confine him to tea, coffee, milk, and slops of any kind.

Cod-liver oil.

211. Cod-liver oil produces a somewhat similar effect to that of alcoholic stimulants. It disturbs digestion, interferes with the appetite; by its local action on the lungs, it hinders the elimination of tubercular matter, favours the fatty degenerescence of tissue, to which the patient is already prone; diminishes oxydation, thus increasing, without any beneficial effect, the plethora, which the hypophosphites themselves already tend to produce,

and in this way frequently brings on formidable attacks of hæmorrhage. At least *one half* of the failures in the use of the hypophosphites are owing to no other cause than their administration along with cod-liver oil. To a person who understands the mode of action of these two remedies, their simultaneous use appears just as rational as would be the yoking together of a steam locomotive and a jackass.

Narcotics.

212. Narcotics, opiates, and sedatives, also produce a contrary effect to that of the hypophosphites. They prevent the return of appetite, they bring on or increase weakness and night-sweats. When, as is frequently the case, the patient has been under palliative treatment of this kind for some time previous to his taking the hypophosphites, the action of the latter will generally be delayed thereby. When narcotics or sedatives have been used for the purpose of allaying harassing cough at night, it will frequently happen that their suppression will be attended with more or less distress to the patient. But it must be persisted in, if we wish to obtain the effects of the specific treatment. In such cases as these the inhalants are found to be of particular benefit, not only by seconding the effects of the hypophosphites, but by producing almost immediate relief of the lung symptoms.

Tonics.

213. The same remark applies to the use of the large class of medicines included under the term of tonics, such as bitters, vegetable alkaloids, &c.

Acids.

214. The presence, in a mixture containing the hypophosphites, of metallic salts or of salts with excess of acids, or of free acids, will frequently bring about the decomposition or the oxydation of the salts of phosphorus, and thus modify or altogether destroy their effect.

What not to prescribe.

215. The following, which is a literal copy of a prescription by one of the leading London physicians, is a type of what the practitioner should most carefully *avoid*:—

Calcis Hypophos.	ʒ jss.
Liq. Ferri. Pernit.	ʒ iij.
Liq. Strychniæ	ʒ j.
Quiniæ Sulphatis	gr. xviij.
Syrupi aurantii Floris	℥ jss.
Aquæ aur. Floris	℥ vj.
Aquæ Distillatæ	℥ xij.

215 A. Dr. Williams gives a formula in which he prescribes a hypophosphite along with phosphoric acid. ('On Consumption,' pp. 326, 360.) This simply serves to form a phosphate and to set free the hypophosphorous acid, the danger of which, in its uncombined state, I have already pointed out (108).

215 B. In a word, I would wish to warn practitioners against the use of any other drug whatsoever along with the hypophosphites, unless it be for the express purpose of fulfilling some temporary and well-defined indication.

215 C. We thus see that there exist a number of serious causes of error which should be carefully avoided, as they may easily be, when they are once pointed out.

Excitability produced by specific.

216. It will sometimes happen that the patient or his medical attendant will look upon certain disturbances following the action of the hypophosphites as unfavourable results, and be thus induced to give up the treatment. The morning is usually the best time to give the hypophosphite. In children and in delicate highly nervous females, particularly when the nervousness is dependent upon uterine complication, if the remedy be taken in the morning, its stimulating effect will become apparent during the night, and the patient will complain of restlessness and want of sleep. This will usually be got rid of by changing the hour of administration. By giving the remedy at bed-time absorption and assimilation take place during the night, and its physiogenic effects of increased comfort, strength and activity, manifest themselves during the day to the satisfaction both of the patient and the practitioner.

217. Sometimes the patient's appetite increases considerably, but the digestive power of the stomach, owing to deficient supply both in the quantity and the quality of the blood, has not improved in the same ratio. The patient, therefore, complains of increased difficulty of digestion. This is attributed to the hypophosphites, and they are struck out. By observing the very simple precaution of keeping the patient at first to the same regimen, and the same amount of food as he has been accustomed to, and only changing or increasing them by degrees, this apparently unfavourable effect of the hypophosphites will be seen to be a result of the efficacy of their action.

Apparent digestive trouble.

217A. Many cases, however, of gastric disturbance noticed by other observers have been undoubtedly due not to this cause but to the impurity of the salts used, and particularly to the presence of an excess of base (171B, 185, 187).

Gastric disturbances.

218. As repeatedly pointed out, the practitioner in the use of these remedies must never lose sight of the necessity of advancing slowly and gradually along the whole line of improvement. There must be no sudden spurt or burst, and no one function can be stimulated physiologically and usefully to the patient, unless the others are able to follow and keep up with it. Health is nothing but the equilibrium of all the functions of the system.

Equilibrium of functions.

219. There is another thing to be remembered. The idea of physic is, from habit, so closely associated in many minds, particularly among the uneducated, with the notion of something nauseous, and the expectation of remedial action is so frequently that of a violent and marked effect, that some patients will hardly consent to take the hypophosphites for any length of time, when they find them given in the form of a simple syrup without taste or smell, and being apparently nothing more than so much sugar and water. On the other hand, I have

Fancies of patients.

found patients declare that the hypophosphites produced all sorts of disagreeable effects, simply because they had made up their minds beforehand, that all 'physic' must do so. That this was really a mere effect of their imagination I have repeatedly proved by having the hypophosphites administered to them without their knowledge, in tea, coffee, or some similar vehicle.

Climate.

220. One or two other points require a few observations.

Climate and temperature have been supposed to have a great influence over phthisis. This is now an exploded error among all well-informed physicians, though patients and the public may still cling to the old superstition (43, 424). Undoubtedly, whatever increases the inflammatory condition of the lung is an aggravation of phthisis, and whatever wards off this aggravation, will prolong the life of the patient. But this result is comparatively of secondary importance, as long as he is still suffering under the diathesis, that is, the real constitutional disease. Whether the patient is living south or north, consumption left to itself or treated by the ordinary means, ends in the same way. It is only a question of time.

Not to be compared with the specific treatment.

With the hypophosphites consumption may be cured, and is now cured, every day in Russia or in Canada as well as in Italy, Egypt, or the West Indies.

The use of the stœchiological inhalants does for the local condition of the lung what the balmiest air of any climate can never do. They act as a preservative against the unfavourable conditions of the atmosphere, they promote and effect the cicatrization of the lung tissues, independently and in spite of the adverse influence of climate. In London and in mid-winter, with the inhalants, either alone or in combination with the hypophosphites I have cured consumptives in all stages of the complaint, bronchitics, and asthmatics, some of the latter after more than twenty years' suffering; among them were natives of India, of the West Indies, or of the south of Europe, who had vainly sought for relief, either under their native skies, or in other countries. Of course I do not mean to say that in a northern climate patients have not more unfavourable influences to contend against than in the warm and sunny regions of the south. What I assert, and what nearly all competent physicians are now agreed upon, is that climate of itself never *cures* consumption. In order to obtain this result, we must add or oppose to the influence of climate, as the case may be, whether north or south, the action of the specific remedy. What I wish above all to establish is the fact that the power of stœchiological medicine and of stœchiological remedies under their two forms, general and local, is so great in lung diseases, that they triumph not only over the disease, but even over the most adverse external influences. It is therefore good that patients and those about them should have no illusion upon this subject. By spending his winters in the south a patient does not increase his chances of *recovery*. He can only hope to prolong his life one or two, at most a very few years, by removing himself from a certain number of unfavourable circumstances, which would have aggravated his condition, and hastened the disease. He does by means of climate what is sometimes done by means of ordinary medicines. He gets relief and diminishes the complications (17, 18, 20). But he cannot expect to be cured (423—437). That can only be done by means of the specific treatment. From the fact that climate and mildness of temperature alone *never cure* consumption, we may draw one important consequence for those who use the hypophosphites, which is, that during the summer season, when most of the symptoms, and particularly the cough, are frequently much reduced, or even disappear for a time, the specific treatment should nevertheless *not be left off*, as is too frequently done. On the contrary, as the disease is then reduced, so to speak, to its simplest expression, this is the very time for using the remedy, as the patient is in the best condition for it to produce its full effect.

But, although climate and temperature have no curative action in phthisis, although their adverse influences may be successfully overcome, particularly by the use of the inhalants, it does not follow that they are matters of indifference, especially when the patient is restricted to the use of the hypophosphites alone. A great deal has been written about the special influence of particular climates, and in more than one instance of late years, results have been claimed for particular places which were in reality due to the use of the hypophosphites. Mentone and Australia are two remarkable cases in point, as will be seen further on (435—491).

Temperature. 221. There is one main point in this matter, which the patient should keep in view, particularly when using only the hypophosphites, that is, the advantage of *uniformity of temperature.* The degree of warmth out of doors is comparatively of less importance than is generally supposed. The one thing the patient should avoid is change, and above all, sudden change, whether from hot to cold or from dry to damp. And this applies not only to climate, but to the temperature of his abode, of his sleeping-room, of his bed, of his clothing, and of all those conditions, which are classed by hygienists under the name of *circumfusa*, and which influence either the external temperature of the body or the temperature, density, and moisture of the air, which he breathes. He should carefully eschew open windows, whether by day or by night. Instead of advising, as is done by some physicians, that a consumptive patient should sleep with open windows in England, even during the winter, I look upon such conduct as little short of abetting suicide. Healthy persons can seldom do so without catching cold, that is to say, without exciting more or less inflammatory action in the mucous membrane, or even in the tissue of the air passages. Now we have repeatedly seen that this is one of the aggravating causes of consumption. How then can consumptives expect that such conduct may be followed with impunity?

Air—Dr. McCormack.

222. I know that it has been supposed that consumption was induced by the want of oxygen. Dr. McCormack has written two very learned and interesting books ('The Nature, Treatment, and Prevention of Pulmonary Consumption,' London, 1855; 'Theory of Consumption,' London, 1858) upon this subject, and his theory happens to chime in with the present popular mania for pure air, pure water, pure earth, and pure elements of every kind: all which involve a chemical impossibility. The facts collected by Dr. McCormack embrace a very wide range, and apparently to a great degree confirm his theory. But there is this one drawback. The substitution of the purest air for a vitiated atmosphere has hardly yet ever cured a single case of consumption. Nearly a century ago the use of a super-oxygenized atmosphere was tried in the treatment of consumption by Dr. Beddoes, and failed completely. (Watt and Beddoes 'On the Use of Factitious Airs,' 1794.) I shall show further on (398—400) that all the facts collected by Dr. McCormack fit in with my theory of the disease, 'the want of an oxydizable phosphorized compound in the system.' If the want of sufficient oxygen were the *specific* cause of consumption, all those who breathe an atmosphere deficient in oxygen would become consumptive. Now we know that such is not the case. Consumption is no doubt the consequence of insufficient oxydation, not however because the supply of oxygen, introduced into the lungs is insufficient, but because the elements in the blood which ought to take up this oxygen have fallen to a lower degree of combustibility, and are unable to do so. The vital fire in the organism burns low, not owing to an insufficient supply of air to the furnace, but

because the fuel itself has lost a part of its combustible power.

Baths. 223. This principle, of the necessity of an equable temperature, has a direct application to the question of baths. This is a delicate subject with English patients. People in this country are *now* so convinced that cleanliness is next to godliness, and, above all, to respectability, that it is very hard to get them to reason sensibly on the subject. There is also not only among laymen, but among the profession, a crude and unscientific notion of some intimate connection between the cutaneous exhalation and the respiratory process, and that the first is to a certain extent supplementary to the second. Hence the supposed utility of what is popularly called 'keeping open the pores of the skin.' These two prejudices combined make it very difficult for a patient to understand that if it be disagreeable in the smoky, sooty, smutty atmosphere of London, to allow one's skin to get into the condition of a coal-heaver's, it is better to do this, even at the risk of feeling and looking like one of the 'unwashed,' than to increase the irritation and congestion of the lungs, which always exist in phthisis, by the process of 'tubbing,' or rather of 'smearing,' miscalled 'bathing' in this country. Every time a spongeful of water is applied to the skin, it modifies the circulation in that part, as water is a great conductor of heat. This is accompanied by a corresponding modification in the circulation of the system, and consequently in the lung, which will be greater or less according to the difference of temperature between the water and the body. But this is not the worst part of the process. When one part of the body has been sponged, it is left wet, and consequently subject to the fall of temperature produced by evaporation, while the same process is being gone through with another part, so that, the patient is by turns *suddenly* accelerating or retarding the circulation through the lungs at each application of the sponge. Now no physiologist will deny that anything which causes a disturbance of the circulation in a diseased or inflamed part must be prejudicial. No one would allow this to be done for any external inflammation. Unfortunately the lungs are out of sight, and are obliged to put up with any treatment. Not only therefore will some patients persist in the use of the sponge-bath, contrary to the advice of their physician, but I have known many instances, in which the physician himself has prescribed its use; some in which the patient, already far advanced in consumption, has been told that he should persist in the use of the cold sponge-bath in the midst of a London winter, even when he is suffering from intercurrent bronchitis. It is unnecessary to say what in such cases has been the inevitable result.

Sponge-baths injurious.

223 A. This is one of the frequent causes in this country of the failure of the curative action of the hypophosphites. The truth must not be concealed from the patient. In many cases the use or the omission of the bath will be for him a question of life or death. I am in the habit of recommending my patients, if the case is far advanced, to abstain altogether from bathing during the beginning of the treatment and until cicatrization of the lungs has taken place. Even then the use of the bath for consumptives should be accompanied with every possible precaution against taking cold. The patient must take, not a sponge-bath, but a bath in which the whole of the body may be immersed at once. He should not remain in longer than the time necessary to have the whole body well scrubbed with the flesh-brush. The temperature of the bath should be between 85° and 96°—higher in winter than in summer; and it will be found that it is above all advisable to use the sulphur-bath instead of the simple one. This not only acts by thoroughly cleansing the skin by means of its alkaline base, but by its stimulating action makes the patient much less liable

to cold afterwards. These baths should not be used oftener than every ten days, or a fortnight at most, even in London, where they are more required than in places with a clearer atmosphere.

Diet. 224. With regard to the patient's diet, it will not be found necessary, while he is taking the hypophosphites, to prescribe or to forbid any special kind of food, provided the digestive powers be unimpaired, otherwise it may become necessary to order some special regimen. Continental physicians are very much in the habit of forbidding the use of vegetables of every kind; above all, of salads, sometimes even of fruit. I find all such restrictions useless, and that it is far better to stimulate the patient's appetite by the variety of his diet.

Exercise. 224 A. The first and paramount requirement of diseased lungs as of all other suffering organs is *rest.* Any amount of exercise which calls from them for any more action than is absolutely necessary to keep up the general health is positively and directly injurious.

Care required after recovery. 225. Even when once the patient is well, he must not think that all is over, and that he will be able to bear fatigue and exposure with the same degree of impunity as if he had never been ill. If a portion of the lung has been destroyed, if a cure has only been effected by the formation of a cicatrised cavity, it is easy to understand that this loss of lung tissue implies a corresponding decrease of respiratory power, and consequently contracted vitality and energy of the whole system. But this is not all. The new cicatrised tissues, as may be seen by looking at any scar on the skin, will remain for a certain time more vascular, and consequently more prone to congestion and inflammatory action than the normal ones, and this remark holds good, not only when there has been a cavity formed, but even when the tubercular matter has been reabsorbed, and a cure has taken place by resolution. The surrounding tissues even in this instance will have been more or less modified in the consistency of their texture, and consequently, will remain more predisposed to inflammation, and less able to resist any extra strain which may be put upon them. The patient must, therefore, be careful for a considerable time. He must avoid fatigue, excess, and exposure of every kind, in order to give the new tissues time to acquire stability and strength. This sometimes requires as long as three or four years. He must do for his lungs, although out of sight, what he would naturally do for a burnt arm or a broken leg, which is not so.

These precepts are the result of experience, which has now extended over many years, of the attentive comparison of a large number of instances, and of considerable and minute research. By strictly adhering to them, the hypophosphites will be found, in many cases, to give even better and more constant results than those which have hitherto been obtained by their use.

Relative plethora.

226. In what precedes I have frequently made use of the terms, 'relative plethora.' This is of importance, and requires a word of explanation. If there existed a means of suddenly increasing the amount of blood in the system, it is evident we should thus be able to bring about a state of relative plethora, that is, a quantity of blood superior to that which the different organs in the system are accustomed to work with. Now the hypophosphites do possess this power of increasing very rapidly the intensity of hæmatogenesis or the blood-forming process. But if the lungs be extensively diseased, they will only be able to use a much smaller amount of blood than if they were in a sound condition; and the patient may therefore be suffering from *relative plethora*, although still far from possessing the ruddy hue of health, and, absolutely speaking, still in a condition of anæmia, or deficiency of blood.

Shor-

226 A. Nutrimentary changes to be beneficial must be

be produced suddenly.

produced gradually. The different organs in the system require time to accommodate themselves not only to a change in the quantity, but also to any alteration in the quality, that is, the potency, of the nutrimentary fluids with which they are supplied. Many of the failures of transfusion are due to a neglect of this consideration, and what is more to our present purpose, in many cases this is the true explanation of the non-success of the hypophosphites. The best physiologists have, however, insisted upon this fact. Longet ('Traité de Physiologie,' Second Edition, Paris, 1859, p. 373) says, 'The absorption of nutritive material can only be of use to the organism if it takes place so gradually as not suddenly to change the composition of the blood. This is an essential condition of all normal nutrition; for as soon as a nutritive element absorbed into the blood exceeds a certain amount, it is thrown off by the urinary secretion, or by other channels. Glucose, for instance, although so highly assimilable, when absorbed by the intestine in too large quantity, or in too short a time, does not undergo combustion in the system, and passes off by the kidneys. This has been proved experimentally by P. G. de Becker and myself, by injecting a large quantity of dissolved glucose into the stomach of rabbits, and by afterwards finding it in the urine.'

Time required for results.

227. Supposing a patient to be in the conditions of curability already pointed out, and supposing the specific treatment to be administered according to the rules, and within the limits laid down, it follows from what precedes that there is one more element indispensable for the success of the treatment, and that is time. Every organic modification in the animal system requires time. The process of repair takes place but slowly, and, so to say, by insensible steps.

Robin (Robin et Verdeil 'Chimie anatomique et physiologique,' Paris, 1853, tom. iii. p. 406) says: 'The cure of a general disease requires a long process of nutrition, and for the time thus required no substitute can be found. We may foster it, hasten it, prevent it from going back; but we cannot suddenly restore the elements of the diseased substance to their first state of molecular combination and relative quantity, &c. For all this time is required. Thus the successive study of the different parts of the system gradually destroys the chimerical hopes which misled our predecessors, such as the discovery of universal remedies, and in lieu of them gives us the notion of a power, limited on our part, but really existing. We must, therefore, give up our vague aspirations towards unlimited and indeterminate power, and for it we must substitute the idea of attaining, under certain conditions of time and proper means, a real result which has been determined beforehand.'

Physiology, therefore, gives us in this case, as in many others, the best key to pathology and therapeutics. No one who, like myself, has had the advantage of being reared in the school of such observers and experimentalists as Drs. Longet and Robin, could have supposed, as many of my adversaries have done, that the *cure of consumption* by the hypophosphites was a kind of sleight of hand, and that every case could be cured irrespective of all conditions, either with regard to the patient, or to the means of action (59, 165). But not only must the rational practitioner expect that the cure of an advanced case of consumption will be a matter of time; he will foresee that, although the system be kept supplied with the phosphide element, and thus be enabled to rid itself of the morbid deposit by one of the different ways previously pointed out (152—157), it may not always go through the different stages of this long and complicated process without the occasional occurrence of some accidental disturbance.

When once the phosphorized treatment has produced all the improvement in the general condition of the patient compatible with the amount of lesion existing in the lung, the local trouble may nevertheless remain stationary for more or less time. If the lungs are seriously involved, the stethoscopic signs may vary from time to time with the varying external circumstances, particularly those of season and climate. In such cases, the true clinical observer will not be in haste to conclude from a temporary aggravation (161—165) of the local symptoms that the treatment is of no avail, throw it up, and cast his patient adrift from what is and should be his sheet-anchor. A case of pneumonia, or even of simple bronchitis, may last two months or more, and may pass into a chronic stage of indefinite duration. Pleurisy will give stethoscopic signs persisting during the whole life of the patient. Yet the very man who has observed these facts over and over again, will expect tubercular matter, nay more, the inflammation, the anatomical disorganisation, the absolute physical destruction it has produced, to disappear within a few days, and will scout the idea of calling a 'specific' a remedy which does not produce an effect of this kind. When will clinical observers learn to use, in the study of therapeutical phenomena, that minute, patient, and sometimes superabundant observation which they employ in the registering of morbid symptoms, and in the pursuit of pathological research? In a consumptive patient, after disappearance of the diathesis, after the lung tissue is cicatrised or repaired as far as such repair is possible, we must expect, in many instances, to meet with the persistence of stethoscopic signs, which will vary with the amount, the extent, the degree of the lesion, with the habits of the patient, and with external conditions.

I have already stated that three years after the cure of the diathesis was the period during which progressive improvement might still be looked for in the condition of the lung, and that this may be greatly facilitated and hastened by the use of the inhalants (156, 167).

Nature of action of the hypophosphites. What is a specific?

228. In what precedes I have frequently made use of the term 'specific' as applied to the action of the hypophosphites. This has been done advisedly, and I wish to explain my meaning not only because it is important to a due understanding of this action, but because the question has a direct bearing upon our general views of therapeutics and of all medicinal action. I have raised a violent storm about my head by the use of this term; my adversaries have flung it at me as a word of reproach, as if no one, not beside himself, could entertain such an idea; my supporters have generally fought shy of the question, or quietly dropped it overboard. Now I attach very great importance to this word, and above all, to the idea it represents. In the sluggish waters of medical thought false notions have clustered round the idea of a 'specific,' just as barnacles do round an idle ship in a sleeping tropical sea. In this, as in so many other questions, men repeat one another's words without ever asking themselves what they mean. The current notion is that there is no such thing as a 'specific' because a specific means, as they say, an 'infallible remedy' for a given disease. No wonder that philosophers such as Mill and Buckle, when reading such outrageous trash, should conclude that medicine is still in the theological stage, that doctors are no better than the augurs of old, and that no two of them can look one another in the face without laughing. What science or what art but that of medicine has ever pretended to an 'infallible' process? 'Infallible' means unconditional. Science, on the contrary, is the attainment of definite ends by definite means under certain given conditions, and the object of all science is the discovery of these means, and of the conditions which are to guide us in their use. If there be no such thing as a specific or special action in therapeutics, any one remedy will act the same as any other, and there is no reason why, instead of giving opium to

produce sleep we should not give aloes or castor oil. But the accepted maxim that there can be no specific medicine is qualified by the reservation that there are a few remedies which may perhaps be looked upon as specifics, such as mercury in syphilis, sulphur in itch, iron in certain forms of anæmia, and above all, cinchona, or its active principle quinine, in intermittents; not to mention the ideal and realised type of all specifics, vaccination against smallpox. Now it is evident at first sight that these four remedies, if not infallible, really do cure or prevent these diseases in the greater number of instances, and above all, evince a potency of action to which no other remedy can approach. If they do not cure in every instance, it is because their action can only be conditional, and that at least for two of them, mercury and quinine, we are to a great degree ignorant of what these conditions are. Still, however, these examples so far from leading us to declare that specifics are altogether impossible, that the idea of a specific is an absurdity, ought to induce us to wish that we had many more remedies of the same kind, and to endeavour if possible to discover some.

Specifics already known.

The most singular thing in this matter is that the present medical doctrine which assumes to itself the title of 'orthodox,' while rejecting the idea that there can be any 'specific remedy,' admits the notion of the specificity of diseases. All the labours of pathological anatomists for the last two hundred years have been directed to the determination of the anatomical, that is, the fixed and permanent characters of each special disease, as found after death, which distinguish it from all the rest, because they offer for each disease a static and determinate group of characteristics in contradistinction to the variable and dynamic modifications afforded during life by physiological disturbances.

Inconsistency of received opinions.

Specificity in allopathy.

But while the allopaths, who have been labouring for

Specificity in homeopathy.

centuries to establish the specificity of diseases, scout the idea of specific remedies, the heterodox school of homeopaths, who hardly admit the existence of morbid entities, and split up each disease into its symptoms to such a degree, that it becomes frittered away almost to nothing, base all their therapeutics upon the specific action of remedies against symptoms. This is the fundamental objection to homeopathy. Each symptom does not of itself constitute a disease, nor is amenable at all times to the same mode of treatment. The cough proceeding from temporary laryngeal irritation is no more to be compared with the cough of consumption than the lameness due to overfatigue is the same as that produced by a broken limb. If this aspect of homeopathy were grounded upon fact, the study of anatomy and physiology would be altogether useless and medicine would be reduced to a list of symptoms and a corresponding list of remedies. Such is indeed the fact with one part of the homeopathic school. Some of my non-professional readers may perhaps be inclined to think that this extreme simplicity is far from being an objection, which no doubt would be correct if such a classification were really true. Unfortunately it is not so, and those who might be inclined to think that so complex a piece of mechanism as the animal system can be managed by attending to only one symptom at a time without any regard to its connection with other antecedent or concurrent phenomena, should ask themselves what would happen if they adopted such a principle in endeavouring to remedy a disturbance in any piece of machinery, such as a watch or a steam-engine, far less complicated and more easily seen through than the organism of living beings. The fact that each living being is a unit in itself shows that all the varied phenomena which it presents must be in a certain relation to each other and be constantly acting and reacting upon one another.

Specificity of diseases.

229. If we admit, as is the present object of all clinical teaching, that certain definite groups of symptoms depend upon certain other definite organic condition or conditions, we are inevitably led to the conclusion that each disease constitutes in itself a morbid entity, a peculiar or specific modification of the system, which, unless checked or interfered with by external causes, carries it naturally, regularly, and inevitably, through a certain definite series of morbid processes ending either in death, in recovery, or in some permanent modification of the system. The very words inflammation, tuberculosis, small-pox, fever, indicate certain well-defined conglomerations of idea, which point inevitably to the conclusion that there must be in each of these different states some one or more peculiar conditions, which make it what it is, instead of being something else. If we only knew what are the special *essential* conditions which produce in the system a given disease, we should plainly see before us the object we ought to aim at for its prevention or its cure. Whatever the number of these *essential* conditions might be, the suppression of any one of them would put a stop to the disease. Let us take an example from chemistry and physics. No one will deny that water is a specific against fire; that is, if a sufficient quantity of water be thrown upon a fire, it is sure to put it out. Until the discovery of oxygen and of the chemical conditions of combustion, at the end of last century, the exact mode of this action of water was not known. No doubt it had been already ascertained that the exclusion of air would put out a fire. But it is only since we know that oxygen is the true supporter of combustion in the atmosphere, that we have been enabled to substitute for the use of water that of any gas, which is not a supporter of combustion, such as carbonic acid. The knowledge of some of the *essential* conditions of the phenomenon, with which we want to

interfere, has therefore shown us several ways of doing so, has lead in fact to the discovery of several *specifics* against combustion. If, for instance, the chimney be on fire, and there be but little fuel in the grate, throwing water upon it will not produce sufficient steam to fill the chimney and put out the fire. But flowers of sulphur when once lighted will burn of themselves, and evolve a large quantity of sulphurous acid, which is a non-supporter of combustion. Perhaps there might be no fire at all left in the grate, no means of kindling the sulphur, and in that case a certain quantity of aqua ammoniæ or solution of ammonia, which is highly volatile at the ordinary temperature, will have exactly the same effect. We thus see that our knowledge of one of the essential conditions of the process of combustion enables us to interfere in several different ways, all leading to a suppression of this essential condition.

Specificity of remedies.

230. Unfortunately when we come to specifics in medicine we have no precise definite knowledge to guide us, as in chemistry and physics. With regard to the specifics hitherto known, and the diseases against which they are employed, we know not what are the primary and essential conditions of these, nor what is the true mode of action of the former. Nay, therapeutics are in such a backward state that we have not even yet decided what are the best conditions for the action of each of the specifics hitherto known (113). Still, in spite of all this ignorance, I think there can be no doubt of the following conclusions being pretty near the truth :—

1. A specific is a remedy which has a *certain determinate and uniform action* against a given disease and is thus superior to any other.

2. This action must depend upon its interfering with, preventing, or destroying some one or more of the *essential* conditions upon which the disease depends.

Such being the case, what is to prevent us from arriving at the discovery of new specifics, in fact, of a specific for every morbid entity? The existence of the *specific* disease involves the possibility of the *specific* remedy.

'Drugs' are not remedies.

231. Unfortunately, the present tendency of therapeutics lies exactly in the contrary direction. Instead of trying to find out 'remedies,' we are only busied with inventing 'drugs;' that is, a means of acting with more or less certainty upon one or several symptoms of a disease without caring what the ultimate result of this action may be.

The action of these drugs in the vast majority of instances consists merely in the production of a certain amount of disturbance in the system, too frequently even in an aggravation of the patient's condition; after which, when left to itself, the system sometimes recovers its equilibrium, and the patient is said to have been cured by the drug. This is very much like shaking a watch to make it go; sometimes we may succeed, and sometimes we may make it stop for good.

Acute diseases.

232. If we take the two great classes of disease, acute and chronic, we shall find that the former all run a definite course, unarrested, if not uninfluenced by the action of our medicines. At the end of a certain period of time, either the patient is dead or has recovered completely, or remains affected with some chronic ailment, or some permanent lesion. All that medicine hitherto has been able to effect, is sometimes to moderate functional action, to soothe suffering, and keep up the strength of the patient. At the present day this is even looked upon as the only true object we should have in view in such cases; and no doubt when the malady is of slight intensity that will be found sufficient. But in serious and mortal disease it simply means that we are altogether powerless; and that, instead of stemming the current, we can only float down along with it, in the hope of sometimes gliding through the rocks and breakers.

If we really possessed a medicinal agent capable of influencing any one of the *essential* conditions of any given acute disease, there would be some one stage of it during which we should be able not only to arrest, but to eliminate it from the system altogether. The only acute disease in which we can do this at present is intermittent fever, which is cut short immediately by quinine. Scientifically speaking, small-pox might be classed also in this category, but here vaccination is only of use preventively. There is no reason why the day may not come when for every specific acute disease there may be a specific remedy. Belladonna was stated by Hahnemann to be the specific of scarlatina. There is no doubt that it does exert an influence over the complaint; and it is a great reproach to so-called orthodox medicine that at the end of more than half a century this question, like many others of the same kind, should remain undecided.

Chronic diseases.

233. If the usual method of drugging appears of little use in acute disease, it is even less efficacious still in chronic. Here we no longer have to deal with functional disturbance, or with temporary modifications of the fluids and metamorphic elements of the system. The organic substance itself has generally become changed, and in most cases has no tendency to revert to its natural condition. Here also it is that we meet with all those great *lacunæ* which stand out as utter blanks on the face of medical science.

Too many drugs—too few remedies.

234. Hence it follows that although our *materia medica* is already overloaded with more substances than we know how to use, the number goes on increasing every day, and we are constantly invited to try the effect of new means, not of curing, but of merely influencing symptomatically, our patients, and thus doing over again, sometimes better, oftentimes very much worse, what we are already enabled to do by existing means.

This is often purely a result of commercial pharmaceutical speculation. The pharmaceutical chemists, who are utterly ignorant of disease and its conditions, are the men who propose new remedies, and the physicians who too frequently are utterly ignorant of the chemistry of drugs, sometimes even of their very names, are the men who apply them. I am not certain whether members of the College of Physicians do not consider it beneath their dignity to dabble in such matters, just as even now they are not allowed to practice surgery, and formerly would have been expelled if they had attended a case of midwifery.

The advanced physician, instead of constantly striving for the one single object, which should be his guiding star amidst all the doubt and difficulties of his art, the cure of his patient, takes things as they are and limits himself to what is called euphemistically seconding the efforts of nature, as if the efforts of nature were not as often directed towards an unfavourable as towards a favourable termination. This is the 'intelligent' physician; the man who has little or no faith in drugs, perhaps still less in the art he practises, but invariably an immense outward show at least of faith in himself. This is one class. But there is another, the practical man. He goes in for plenty of physic, tries all the new remedies in turn for every possible disease, with as little care and as little intelligence as he has used the old ones. In fact, something like his cook, and perhaps with far less scientific foundation to go upon, if he finds that one sauce does not suit his patient, he simply dishes him up with another. Ten years ago I wrote what I am sorry to have to repeat now, that there is no manual art, no mere mechanical process, which is not carried out with greater pains and with more technical care than is sometimes displayed in the practice of medicine.

The hypophosphites a true specific.

235. Now supposing that, as I assert, the *specific* remedy for tuberculosis consists in the use of an oxydi-

zable phosphorized compound, does it at all follow, as my adversaries pretend, that the hypophosphites ought to cure consumption in every case? Far from it. That would, in fact, involve the idea that a specific was 'infallible,' which is simply a logical contradiction (165, 228). The specific of consumption, like all other specifics, in fact like everything else in the whole world, can only act within certain given definite conditions. Vaccination and quinine are subject to this rule, and we know enough about them to say to a great extent what the rule is in their case. We know, for instance, that the vaccine matter must have produced a characteristic pustule, possessing certain definite features, and must have been absorbed into the system, before we can depend upon its preservative effect. We know that quinine has a most potent action in preventing the recurrence of the fits of ague produced by marsh miasmata, but we know also that when these have been allowed to recur for a sufficient length of time either through neglect or incompetent treatment, the internal organs, the spleen, the liver, the intestine, become disturbed, congested, sometimes inflamed, suppurating or ulcerated, and *then* we find that the whole paludal disease, of which the ague was only the initiatory stage, is no longer amenable to quinine alone, that hepatitis and dysentery may call for other means, because the poisoning of the system has gone beyond the stage where the quinine has its specific effect. Let us apply these experiences to the hypophosphites, and see whether they come up to our newly-acquired ideas of a specific. It might so have happened that the deposit of one single tubercle in the lung might have proved absolutely fatal. Except from what was known in the few cases of spontaneous cure, we should have had no right to conclude *à priori* that such might not have been the case. Theoretically speaking, therefore, the hypophosphites might have been the specific remedy for consumption,

Objections answered.

and yet never have cured a single case, where once the special characteristic deposit had taken place in the lungs. Fortunately, however, that is not so. Still, as I have repeated over and over again, the oxydizable phosphorized compounds are the specific of the *tubercular diathesis*, that is of the general or constitutional state which is the starting point of the disease. They are not the specific of the *local lesion*, that is of the inflammation or ulceration produced in the lung by the presence of the tubercular matter deposited in it *before* the use of the remedy. They prevent the deposit of further tubercular matter in the lung, and thus allow the latter to go through, without any further aggravation, the processes of evolution, to which it is fated by what had taken place in it before the use of the remedy was begun (15, 17, 44).

It is true, the action of the specific treatment is not limited to the mere cessation of the diathesis. The disappearance of this latter condition is brought about and accompanied by the whole series of physiogenic changes, which have already been fully described (118—127). So that not only has the enemy ceased his inroads, but the whole system is nerved and invigorated to expel him from his local stronghold. In this respect there is the closest analogy between the specific action of the hypophosphites and that of mercury and iodine in specific diseases of another kind. When there is a local lesion depending upon the specific condition of the system, cicatrization only takes place after this particular state has been removed, but when the local disturbance, as is usually the case in syphilis, instead of merely involving the integuments or the mucous membrane, has got deeper into the system, and affects the bones or the more solid tissues, it often happens that even the removal of the diathesis is not sufficient to produce a cure, and that the aid of local or even surgical means may be required. While, therefore, there is a complete analogy between the action of the specifics in syphilis and the action of the specific in tuberculosis, there is this great and important difference. The organs and systems at first involved in syphilis are of minor importance, while in consumption they are among the most essential to life.

We have seen in what precedes that *recovery* in consumption, while under the use of the hypophosphites, has been recorded *in all stages of the complaint* except the very last, not only by myself but by many other observers (165—170). We have also found that the number of recoveries has depended upon the earliness of the period at which the disease was brought under the specific treatment (152—164). We have seen that in all cases where the local lesions were not too far advanced, the action of the remedy upon the three great functions of innervation, sanguification, and nutrition has been uniformly the same; that this action has been the exact opposite to the general symptoms of tuberculosis; and that whenever this has failed, it has been owing to some defect in the purity of the remedy itself, or of its mode of administration. In the last chapter of my French work (Paris, 1864) will be found more ample details on this head, which I have thought it useless to reproduce here, as for every continental physician that is an exhausted question. To invalidate my assertion that the hypophosphites are in reality a specific for the tubercular diathesis, it would be necessary to show that fresh tubercular deposit had been found to take place while the patient was under the influence of the hypophosphites, given according to the rules I have laid down, and this by an observer who had taken care to guard himself against the special sources of error on that head, which have been pointed out (160—169). I have never met with any instance of this kind myself. I know of no observer, who has positively asserted the fact with the limitations and reservations mentioned. All hitherto published on the subject has been a mere vague and indefinite assertion that cases which ought to have recovered have not done so. No care has been taken to show that the patient had not left off the treatment, that this fulfilled the required conditions, or that the observer himself had been careful to guard against the error of taking for a new deposit of tubercular matter what was merely the natural evolution of tubercles already existing in the crude state at the beginning of the treatment (162), or transient hyperhæmia of half cicatrised or consolidated lung tissue produced by accidental or external causes (168).

When such cases have been duly recorded and published with all that minuteness of research and detail so frequent in pathology and so rare in therapeutics, I shall pay due regard to them. Until now, although my treatment has for seventeen years been assailed by a storm of controversy, I know of none such.

Proofs of this.

236. The unanswerable proof of the specific power of the hypophosphites rests upon the following facts, which now no longer depend upon my sole observation, but have been confirmed by other physicians, and particularly by Dr. Thorowgood (187):—

Their uniformly curative action in the first stage when there are no complications (62, 153).

Their greater potency in hereditary cases (68).

Their almost uniformly curative action in the case of children (70).

Their curative action in cases of acute phthisis, which are the only ones upon record, whereas every other remedy has hitherto invariably failed (65, 66).

Their uniformly curative or preventive action in all cases of suspected phthisis, even when there was a strongly marked hereditary tendency (169, 188).

These views are directly at variance with those of the most advanced and most eminent physicians of the day. The certain curability of phthisis under ascertained and definite conditions, is the point on which I join issue with them. 'The phrase,' says Dr. Walshe ('Diseases of the Lungs,' p. 482), 'the curable stage of phthisis constantly used to designate the earliest morbid condition, while the disease is as yet locally undeveloped, appears to me to signify erroneous views. I do not believe any stage of this disease is more surely curable (in the sense of *curable by art*) than another; and the most satisfactory examples of practical recovery I have witnessed have occurred subsequent to excavation.'

This means that the prognosis of phthisis treated by the ordinary means is, as already fully shown, irrespective of the local conditions, and depends altogether upon the nature of the disease itself (10—44). It is almost invariably fatal. On the other hand, if we suppose ourselves in possession of a specific remedy for the general condition or constitutional diathesis, it is plain that its remedial action must be limited by the pre-existing organic lesion, *i.e.* by the amount of destruction already produced, and by the amount and degree of repair of which the lung and the system are still capable (165). The prognosis is thus based no longer on the nature of the disease, for which we hold the remedy in our hands, but altogether upon the extent and character of the existing local lesions, being entirely favourable when these are slight, and increasing in gravity and uncertainty as these become more aggravated. Now this is exactly what happens in the prognosis of consumption when treated by the hypophosphites, as is shown, not only by my own cases, but also by the uniform experience of all other successful observers. This will be found on consideration an unanswerable proof of their specific action.

In a word the action of the hypophosphites is 'specific' against the diathesis, and is not 'specific' against the already existing lesions, so that the more purely constitutional, so to speak, the disease is, the more rapid and the more complete is the action of the remedy. It is sometimes so rapid and so complete that I have seen cases where the diathesis was very strongly marked, where the progress of the disease was very rapid, and where unmistakeable deposit in the lung had already reached the second stage, cured with such rapidity and with such complete disappearance of all physical signs, that very able physicians, who had had no hesitation in diagnosticating that it was a case of consumption, have turned their backs upon themselves and declared they must have been mistaken, because if it had been a case of consumption it could not have got well in that way. As if they forsooth knew anything of the way in which consumption was cured, or as if they had ever seen a case of the kind before. That a prudent physician should reserve his judgment on the matter until further experience is perfectly right, but no one is right in denying a fact merely because it is observed for the first time.

There can be no doubt that just as it is now recognised that the hypophosphites have a powerful action on the system, and are not as impotent as so much sawdust, as was at one time trumpeted to the world by the Brompton Hospital, so in time also the medical mind will be brought to acknowledge that they are 'specifics' —not 'infallible specifics,' but 'specifics'—in the same sense as sulphur, iodine, mercury, quinine, iron, and vaccination, neither more nor less, perhaps of the two rather more, because not only do they remove the proximate cause of tuberculosis from the system, but they are also a prophylactic, and there will be this difference in their favour, that with the exception of iron, they are the only specific, the use of which is founded upon ascertained physiological and pathological facts, and alone of all specifics hitherto known they have been discovered not by chance but by induction.

Hypophosphites

237. Among the many errors which have agglo-

In other diseases.

merated round the idea of the specific action of remedies, one of the most singular, and, I might almost say, the most childish, is that a 'specific' remedy can have no action against any other morbid state but the one of which it was the special antagonist. It was formerly imagined that disease was of itself a thing independent of the organism, and although modern and more scientific pathology has led us to admit that disease, like health, is only a different mode of existence of the same living tissue or organism, yet this erroneous therapeutic notion still seems in many minds to cling to the idea of 'specific' action. Of course the action of the hypophosphites is not limited to phthisis. Their curative action in this disease is, as has been seen from the whole tenor of what precedes, merely the result of the physiological functions which they perform when introduced into the system. In Chapter VIII. I shall show that a direct stimulating influence upon the three primordial phenomena of innervation, hæmatosis and nutrition, may be legitimately referred to the presence in the organism of certain proximate phosph*ide* principles, in which phosphorus is contained in an oxydizable condition, and which are altogether distinct from the phosph*atic* proximate principles, where the phosphorus has reached its maximum of oxydation, and which were the only ones which had been taken account of in pathology and therapeutics until the publication of my discovery. I shall then also show that these phosph*ide* (not phosph*atic*, 98, 99) elements, being among the constituents of the protein compounds, must necessarily have a direct action upon almost every function, and must therefore exercise more or less influence upon every primordial disturbance of the system (127).

For the present it will be sufficient to state that I have found the hypophosphites particularly useful in the following complaints, for most of which my own experience has been confirmed by that of other observers.

Nervous diseases. Paralysis.

238. *All adynamic conditions of the nervous system. Chronic myelitis—Spermatorrhœa.* In these cases the hypophosphites of iron, manganese, lime, potash, quinine, and baryta, will be found the most useful.

In a recent article in the 'British Medical Journal,' referring to a course of clinical lectures on mental and cerebral diseases, delivered by J. Crichton Brown, M.D., Lecturer on Mental Diseases to the Leeds School of Medicine, the lecturer, speaking of brain-wasting, is reported to have said, 'first, women recover from this disease more frequently and rapidly than men; secondly, the earlier the age at which brain-wasting occurs, the better is the prospect of recovery; thirdly, the more decided the paralytic symptoms, the worse is the prospect of recovery.' He adds 'we owe a debt of gratitude to Dr. Radcliffe for pointing out the value of cod-liver oil and the hypophosphites in debilitating nervous diseases. They supply the essential elements of nerve-nutrition in an easily assimilable form, and are unmistakably beneficial in cases of brain-wasting. A table-spoonful of cod-liver oil and fifteen grains of the hypophosphite of soda given twice or three times daily, at the onset of such a case, often arrest at once the downward tendency, and induce restoration of mental and muscular power.' In my paper read before the Academy of Sciences in Paris I pointed out, as far back as 1858 ('Comptes Rendus,' t. xlvi. p. 1042), this action of the hypophosphites upon the nervous system (292); and Professor Parigot, of Brussels, in an article already quoted (174) from the 'Journal de Médecine de Bruxelles' (April 1858), mentions the case of an old gentleman aged seventy, who had been seized with apoplexy and consequent paralysis. Professor Parigot and Dr. Pousset prescribed the hypophosphite of lime, and the result was the speedy recovery of the patient. Dr. Radcliffe had therefore been anticipated by Dr. Parigot by a period of more than ten years in the use of the hypophosphites in debilitating nervous diseases. So slow is the realisation of any advance in medicine.

Blood diseases.

239. *In diseases of hæmatosis, such as chlorosis and anæmia in all its forms.* In these cases the preference should be given to the hypophosphites of iron, manganese, quinine, and lime. The most inveterate cases of anæmia will be found to yield to this treatment, and the hypophosphite of iron has this peculiar advantage over all other preparations of this metal, that in cases where tubercular anæmia exists, and, as often occurs, has been mistaken for simple anæmia, it not only cures the blood disease, but wards off the effects of the constitutional predisposition, which, as is well known, all other preparations of iron have, on the contrary, a tendency to accelerate and aggravate (415).

Diseases of development.

240. In all diseases depending on imperfect, incomplete, or retarded development, the hypophosphites not only bear off the palm from all other remedies, but will be found to succeed when no other has been of avail. Such for instance are difficult and retarded *dentition in infants, rickets, anæmia*, and *weakness during pregnancy and lactation* (122—126, 169). The hypophosphite of lime for infants, to which may be added more especially for adults those of iron and quinine, will be found in these instances best to fulfil the therapeutical indications. In the Appendix will be found a remarkable case reported by Dr. Sterling, of Burlington, N.J., U.S.A., of the use of hypophosphites of lime, soda, potash, and manganese, in a case of defective nervous and general nutrition in pregnancy.

Teething of children.

Convulsions.

In *difficult dentition* of infants I have seen cases where the little patient, reduced by suffering to the very last degree of emaciation, and either threatened or already attacked with convulsions, has been relieved in the course of a few days, sometimes with the very first dose, and very soon permanently cured by a few teaspoonfuls of my syrup of hypophosphite of lime. The whole apparatus of symptoms has literally been swept away at once.

Chronic bronchitis.

241. In *chronic bronchitis* and in the sequelæ of inflammatory diseases of the respiratory organs, when there is debility depending upon anæmia and lowered nutrition, great benefit will frequently be derived from the use of the hypophosphites, particularly the hypophosphite of potash. A mixture of the syrups of hypophosphite of potash and of soda, will frequently be found more useful than either separately (187). In some cases of asthma, where nutrition has become greatly impaired, the same benefit will be derived from the use of these medicines. But above all, they are especially useful when the local disease of the lungs has already been cured as far as possible by the stœchiological inhalants. In these cases also the hypophosphite of ammonia in the form of tablets will often be found useful in allaying the most prominent symptoms (102).

Chlorosis.

242. The hypophosphite of manganese produces in phthisis the same ill effects as that of iron, though in a less degree. But in *chlorosis* and certain forms of inveterate *anæmia* it will be found to be even more efficacious than the hypophosphite of iron (240).

Chronic hepatitis.

243. Independently of its general action upon the system in common with the other hypophosphites, this salt has a special stimulating action upon the biliary secretion, so that in cases of constipation its use should be preferred to that of the hypophosphite of iron. I have found it specially advantageous in certain forms of *chronic hepatitis*, either alone or associated with the hypophosphite of quinine, and sometimes with the hypophosphite of ammonia.

Tropical fever.

244. The hypophosphite of quinine will, I have no doubt, in time be looked upon as the most efficacious preparation of this alkaloid. It is certainly superior in every respect to the sulphate, which is a very bad preparation (113). I have frequently found it answer in

inveterate intermittent or remittent tropical fever, when all other remedies and all other preparations of quinine and arsenic had failed. In patients debilitated by long residence in the tropics, particularly when suffering from hepatic derangement, my pills of hypophosphite of quinine, as prepared by Swann, will be found of great efficacy (243).

Uterine diseases.

245. Dr. Gantillon, of Paris, in his work on 'Uterine Catarrh' (1868), states that in this complaint he habitually prescribes the hypophosphite of iron, and after continuing it for about a fortnight, changes it for the hypophosphite of manganese. This alternation of medicines, says he, is very beneficial, patients appear to be relieved by the change, and the use of the remedies may be continued for a longer time than with other preparations.

Future application of these results.

246. Many observations of my own might be reported in support of this action of the hypophosphites in other diseases than phthisis based upon their power as primordial stimulants (127), but that would lead me away from the special object of this book: the specific cure of phthisis.

The object of therapeutics should be not the discovery of drugs but of remedies (231—234), and were I to undertake to establish the results just referred to in a scientific manner, it would be necessary to enter into a discussion of the pathology and therapeutics of each of these morbid states.

When therapeutists take their starting point from what will be shown in Chapter X. to be the only true basis of scientific medicine, 'stœchiological pathology,' we shall get rid of the mass of drugs which now uselessly encumber both our heads and our laboratories; our remedies will be much more limited in number, much more powerful and certain in action, and we shall find that instead of having before us a tangled skein of phenomena, which the most acute genius is too often unable to unravel, a few leading and dominant ideas will guide us through the whole maze of morbid states and appearances.

Conclusions.

247. From what precedes the following conclusions may be drawn:—

I. One of the characteristic phenomena produced by the hypophosphites in the system is the production of venous plethora (121, 226).

II. This plethora is the condition of their therapeutic action against phthisis.

III. This therapeutic action must be limited to the physiogenic effects, which afford the measure by which we should be guided in the use of them (116—118).

IV. Beyond this limit their medicinal effects are either transient or incomplete, and are not followed by a curative result even with the coexistence of all other necessary conditions.

V. The use of the hyphophosphites in too large doses, or for too prolonged a period, produces symptoms which I have called pathogenic, and is then apt to lead to accidental complications of variable degrees of intensity, which may bring on a fatal termination, owing to this mistake in the treatment, even though the patient otherwise offers all the conditions necessary for a cure (128—135).

VI. As happens for other cachexiæ, the local lesion, which is the result and the anatomical sign of the tubercular diathesis, when once it has overpassed a certain limit, pursues the usual course of its evolution by virtue of conditions which are to a great extent independent of the initial morbid constitutional state.

VII. The cure of the diathesis is not, therefore, necessarily and immediately followed by that of the lesion, although that of the lesion cannot be permanent unless it be attended or preceded by that of the diathetic condition (228—230).

VIII. The recovery of a patient subjected to the hypophosphite treatment will therefore depend upon the extent of the pre-existing local lesion; that is, of the gravity of the disorganisation which has taken place previous to the treatment (151—165).

IX. When the tubercular deposit has not gone beyond a certain stage of its natural evolution, it may be reabsorbed and entirely disappear. This reabsorption may take place not only when the tubercular matter is still in a crude state, but even when it has already reached the stage of softening (153).

X. This second stage, of softening, is sometimes one of the phenomena intermediate between the therapeutic action of the hypophosphites and their curative effect. Sometimes it simply precedes the reabsorption of the morbid deposit, at other times it will go on to produce ulceration, destruction of the surrounding tissues, and finally consolidation or a cicatrised excavation (154, 155, 163).

XI. The cure of phthisis by the hypophosphites may therefore take place in two different ways, either by the disappearance of the local lesions, and by a cessation of the physical signs which indicate their presence, or by the persistence during a variable period of time of more or less extensive pulmonary disturbance, which, however, does not interfere, or only partially interferes, with the general health, and which does not predispose the patient to a recurrence of the original diathetic condition (156, 163—169).

XII. If during the persistence of the local signs in the lungs the patient be kept in hygienic conditions proportionately adapted to the gravity of the persisting organic lesions; if he be maintained under the influence of the specific treatment at proper prophylactic doses; above all, if in these circumstances he is able to use the inhalants, the stethoscopic and plessimetric sounds will be found gradually to improve, until they lose their pathognomonic character, or even entirely disappear (159, 227).

This last result may sometimes even be obtained in the third stage, that of excavation (155).

XIII. Time is an indispensable element in the cure of a case of phthisis, and no other means can be substituted in its place (192, 227).

XIV. An over-dose of the specific remedy, instead of hastening the patient's recovery, will often produce a contrary effect. The greater the extent, and the more advanced the stage of the pulmonary disease, the more important it is to keep this fact in view, because a contrary conduct will then, still more than at other times, produce accidental complications (128—135, 196).

XV. As in almost all cases of phthisis the tubercular deposit takes place gradually, and invades successive portions of the lungs, there is always a greater or less lapse of time during which the local lesion is of secondary importance; *and until that point has been overpassed, every uncomplicated case of tubercular consumption may be cured with perfect certainty by the scientific use of the hypophosphites* (59—66, 165).

XVI. Every practitioner, who is called upon to treat a case of phthisis is therefore bound, not only for the sake of humanity, but by the rules of medical science, to have recourse *at once* to the hypophosphites, instead of only using them as a last shift after the loss of irreparable tissue, and it may be of irreparable time wasted in administering drugs, which are notoriously of no effect.

XVII. If the hypophosphites be the specific of phthisis, they must *à fortiori* be its prophylactic or preservative remedy (188).

XVIII. As when rationally administered they never produce any unfavourable effect, they should immediately be had recourse to in every *doubtful* case, or even when there is only a suspicion of consumption.

XIX. All these conclusions are now confirmed by the independent testimony of physicians living in all parts of the world (170—187).

XX. In no instance have they been controverted, when the observer has carried out his experiments with care, and according to the rules laid down (191—197). Physicians, who had been unsuccessful in their first attempts, have in later efforts and after greater experience in the use of the remedy, completely confirmed my views (186).

XXI. The effect of the hypophosphites on the tubercular constitution depends upon a general action in the system, which at a future day will come to be recognised as of still greater importance than their effects in disease. In our present imperfect social state there is a constant tendency to increased disturbance of the conditions of normal nutrition, which is effectually combated by the use of the hypophosphites as an occasional and temporary nutriment. This result can be obtained by no other means hitherto known, than the use of some one of the oxydizable phosphorized compounds, the best of which are the hypophosphites (189, 190).

XXII. By means of these therapeutical agents the functions of innervation or nerve power, of sanguification or blood-forming process, and of interstitial nutrition, which are the three primordial functions in the animal system, may be kept or gradually raised to the very highest degree of intensity, of which the organic conditions of the subject will admit (126, 127, 238, 239, 240).

XXIII. It is therefore not only as a remedy, but as a *stœchiological nutriment*, that they will take rank in the hygiene of the future, when medicine having made good its place among the exact sciences, will no longer be either mystery or magic for the million, and when Governments considering that health is the first of all blessings for nations as well as for individuals, will take as zealously the means of saving the lives of men as they now do those of destroying them.

CHAPTER VII.

CHEMICAL AND MEDICAL HISTORY OF THE PROXIMATE PRINCIPLES CONTAINING PHOSPHORUS.

Former use of phosphates.

248. In the third chapter I stated the views by which I was lead to seek for an essential condition of the tubercular dyscrasia in a modification of the phosphorus-element contained in the animal economy. I pointed out the reasons which led me to select the compounds of hypophosphorous acid as the remedial agents, and I stated the facts of which I was cognisant at the time, and which either facilitated or directed my research. My reasons for giving this account were, that if the results thus attained are finally established—and at the present day I think there can be no presumption in stating that, though not publicly recognised in this country, they really are so—medical art will for the first time take rank among the inductive sciences. As will be remembered, after coming to the conclusion that phosphorus was the element of the system which was most likely to yield an experimental result, I determined to try the oxydizable compounds of that body (53), because the oxydized compounds, the phosphates, had already been used, and found to be of no virtue (50). If this had not been the case I should most likely have begun with them, as they were the most easily procurable. The labours of my predecessors who had used the phosphates, Larcher and Benecke, therefore, served to narrow the field of my investigations by showing what part of it had already been explored unsuccessfully. If I had met with no better

result in the use of the hypophosphites than had attended the use of the phosphates, I should very likely have hearkened back and tried the phosphates over again.

Confusion therefrom.

249. Taking advantage of the confusion between *hypo*phosph*ites* and phosph*ates* in the minds of those who are insufficiently acquainted with chemistry, one or two of my adversaries have endeavoured to show that I had been anticipated in my discovery of the specific remedy of phthisis. But this was an after-thought, and was only brought forward when it was becoming evident that my pretension was well founded. Up to that time I was allowed to bear undivided the obloquy of unjustified and unjustifiable pretensions. As long as the specific cure of consumption by the hypophosphites was sneered at, cried down, and branded as 'quackery,' I was the sole offender. When once it became apparent that all this opposition would die away, the next step was to find out whether somebody had not a better claim to the discovery than myself. On the continent that point has been settled. In this country the matter is still in the third stage of contested discoveries, that of the 'conspiracy of silence.' The discoverer's name is carefully and almost invariably suppressed. The hypophosphites are prescribed as little as possible, or if prescribed are, whenever it is feasible, prescribed under some other name. This is the natural course of things—as inevitable as the succession of the seasons or of any other natural phenomena. Nor do I allude to it for the purpose of complaining, but simply to answer objections frequently based upon it by those who are unacquainted with the history of discovery, and above all with that of discovery in medical science.

250. I shall proceed to give a full account of what was known of the phosphorus-compounds in the animal system up to the date of my discovery, for the twofold purpose of doing justice to those who have gone

before me (33), and of pointing out how fitful, how fluctuating, how slow is the progress of invention and initiation, what long intervals of time may elapse between any one step in advance and the succeeding one, and how uncertain and inconclusive the mass of knowledge on the subject appears, until the last final effort, like the keystone of the arch, has crowned and consolidated the whole.

Discovery of phosphorus by Brandt.

251. Phosphorus, which is one of the elementary bodies recognised by chemists, was first discovered in the *animal* system, and it is only comparatively of late years that it has also been found to exist in the *mineral* kingdom. The discovery of this important element is due to a German chemist of the name of Brandt, who extracted it from the phosphates contained in the urine in 1669.

Stolen by Kunckel.

252. Brandt kept his process secret, but having communicated some details of it to a fellow-countryman of the name of Kunckel, the latter found out the way of making phosphorus.

Homberg.

253. In 1712 a German chemist named Homberg discovered that the substance of the urine from which Brandt had extracted phosphorus was the body known as phosphoric acid.

Gahn.

254. In 1768 Gahn, another German chemist, found that the earthy matter of the bones was composed of this same phosphoric acid combined with lime.

Hensing.

255. And, lastly, in 1779 Hensing, another German, found that phosphorus was contained in the brain, but no longer in the form of phosphoric acid as found in the urine and in the bones, but in that of a peculiar fatty matter. This discovery of Hensing is a very important starting-point in physiology, the effects of which are as yet very far from being fully realised.

256. The existence of phosphorus in the animal system has now, therefore, been an established fact for upwards of two centuries, but up to the present time it is an unsettled point whether it thus exists in a completely oxydized state

—that is to say, as the phosphoric acid discovered by Gahn —or whether it is also found in an oxydizable condition, as in the fatty matter extracted from the brain by Hensing.

Liebig and Mulder.

Liebig and his school maintain the first opinion, Mulder and his followers support the second. Still although chemists are and have been divided on this subject, several physiologists had admitted the existence in the system of oxydizable compounds of phosphorus; but until my discovery of the specific cause and remedy of phthisis, no pathological or therapeutical deduction had been drawn from this fact.

Distinction between the phos*phatic* and phosph*ide* elements.

257. Since then, however, the opinion of most chemists seems to incline in favour of the existence in the system of both these forms, which for the sake of distinction I shall call the phosph*atic* and phosph*ide* elements. The phosph*atic* element means that in which the phosphorus is already saturated with oxygen, and exists in the state of phosphoric acid. The phosph*ide* element, that in which the phosphorus is not saturated with oxygen, but exists in a molecular or elementary condition, and is still oxydizable.

Function of the phosph*atic* element.

258. As already stated, the phosph*atic* element was discovered by Gahn in the bones. Subsequent upon this discovery a number of physicians, such as Valli, Baumes, Bonhomme, and Hume attributed great importance to this element, and supposed it played an active part, either in the causation or cure of disease. But their ideas were supported neither by physiological nor by therapeutical proofs. As early as 1783, Baumes had pointed out that there was some connection between the phosphatic element and scrofula, which he attributed to a superabundance of phosphoric acid in the system.

Larcher

259. Later on, but still as far back as 1825, a French physician, Dr. Larcher, who, three years ago was still living at Passy, near Paris, read a memoir before the Academy of Sciences, in which, after stating the fact that

there was an excess of phosphates in the urine of consumptive patients, he concluded that consumption was owing to a deviation of the phosphate of lime contained in the bones ('Archives de Médecine,' 1e série, t. xx. p. 320). Larcher appears in this to have been anticipated by Dupuis.

Dupuis.

Chossat.

260. In 1844 another French physician, Chossat, in a series of remarkable experiments on pigeons, showed that the phosphate of lime is indispensable to the development and the nutrition of the bony system, and that a deficiency of this salt produces such thinning of the bones, that they become quite brittle. Later on, Liebig and his pupils showed that phosphate of lime was to be met with, not only in the bones, but in almost every part of the system, where it was supposed to fulfil a very important function.

Beneke.

261. This led a German physician, Dr. Frederick William Beneke, in 1849 to the conclusion that tuberculosis might be owing to the want in the system of a sufficient quantity of phosphate of lime. This is only the same idea as that of Larcher in another form, and would not have been advanced by Beneke himself, had he known or heeded Chossat's experiments. Evidently when Chossat showed that by feeding pigeons upon food deprived of phosphate of lime they became affected with brittleness of the bones, he demonstrated at the same time that the privation of phosphate of lime did not make the pigeons tubercular. So necessary is a knowledge of the history of science as a preliminary to any well-founded theoretical or experimental research.

Mouriès.

262. In 1852 a French chemist named Mouriès repeated Chossat's experiments, and in a memoir read to the Academy of Sciences, and the Academy of Medicine in Paris, in 1854, he laid down as the conclusions he had come to, that the phosph*atic* element had an immediate action on the production and the degree of vital incitability, not only in plants, but in animals; that there was

a direct connection between the quantity of phosphate of lime and animal heat, and that the food of large towns contained an insufficient quantity of this element, which required to be supplied artificially in conjunction with animal food.

Kœnig.

263. Still later than Mouriès, Dr. Kœnig of Paris in 1856 maintained the proposition that the phosphate of lime was useful to promote the growth of children, as likewise in inflammation of the lungs, and in diseases attended with suppuration.

Phosphates as manure.

264. Simultaneously with these different researches, particularly those of Liebig's school, and as a consequence of the influence they were found to have upon vegetation, the phosphates came into universal use in agriculture, and as is well-known, now constitute the most important of all manures.

Medicinal use of phosphates.

265. But in the animal system their use was not found to produce equally advantageous effects. Liebig himself was the first to demonstrate, that the whole of the phosphoric acid contained in the fodder given to herbivorous animals was *re-excreted*, and not retained in the system.—'Lettres sur la Chimie,' p. 178.

Not assimilated.

266. Kletzinsky found that the phosphate of lime given medicinally, according to the ideas of Beneke, Mouriès, and Kœnig, is wholly re-excreted by the system, without being assimilated.—Schmidt's 'Jahrbücher,' Bd. lxxxvi. S. 156.

266 A. Later on Hegar confirmed Kletzinsky's conclusions, and by a series of analyses showed that the phosphate of lime was sometimes useful as a nutriment, but that this was the case only when the food was notoriously deficient in salts of lime, as in Chossat's experiments (260), and when it was impossible to substitute for it more appropriate nourishment.

266 B. Hence it follows that the phosphate of lime in the system is chiefly important on account of its base, and

that its place may be supplied by some other salt of lime, such as a carbonate. That this is really the case, is proved by the fact discovered by Liebig, that in the blood of herbivorous animals the place of a considerable proportion of the phosphates is supplied by carbonates.—'Lettres sur la Chimie,' Paris, 1846, p. 161.

We thus see that previously to my discovery the phosphates had been tried as a remedy for consumption, and failed. Since my discovery these attempts have been revived, but with no better results (469—474).

Phosphoric acid in phthisis.

267. Previously, however, to any of these attempts at the cure of tuberculosis by means of the salts of the fully-oxydi*zed* compounds of phosphorus (332), phosphoric acid, their characteristic principle, which was discovered by Homberg in 1712, had been used in the treatment of a large number of diseases, which it would be out of place to enumerate here. Of course, it was tried in consumption, as every new remedy in its turn is tried for diseases regarded as incurable, a list of which remedies amounting to several hundreds were given at p. 717 of my French work ('De la Cause immédiate de la Phthisie,' etc., Paris, 1864), and will be found in Appendix II.

A German physician of the name of Lentin (Loder's 'Journ.' B. i. S. 558) was the first, who stated in 1789, that he had cured one case of consumption by this means; but one successful case in a disease like consumption leads to no definite conclusion. Twenty years after phosphoric acid was again recommended by Goeden (Horn's 'Archiv. für Medicinische Erfahrung,' 1811, Bd. i. p. 256), and still later in 1830 by Simeerling of Stralsund ('Journal der Practischen Heilkunde,' July 1830), but the successful results published by them were so few in number, that they lead to no conclusion, and now with our present lights, we can understand why. At that time, as auscultation was unknown, or hardly come into use, chronic inflammations of the respiratory organs, much more easily cured, and much less fatal than consumption, were frequently confounded with it. We have seen in the second chapter that a few cases of consumption, about 4 per cent. (27, 38), do get well under ordinary treatment, and lastly, some of these cures may in reality have been owing to the treatment, because the phosphoric acid used probably contained free phosphor*ous* acid, that is, an oxydizable phosphorized compound, as this is almost always the case with commercial phosphoric acid, as shown by Weigel and Krug, Schmidt and Della Sudda (112, 300).

The phosph*ide* element in the system. In the brain and nervous matter.

Hensing.

Jordan.

Vauquelin.

268. The oxydiz*able* phosphorus-compound, or phosph*ide* element (331), in the animal system, was, as already said, first discovered in the brain by a German chemist, named Hensing, in 1779 ('Examen Chemicum Cerebri, Giessen,' 4to. ed. 1779). Twenty years after, this was confirmed by Jordan ('Disquisitio Chemica evictens regni Animalis ac Vegetabilis elementa,' 1799, p. 26), and later still by Vauquelin, a French chemist, in 1812 ('Analyse de la Matière cérébrale de l'Homme et de quelques Animaux;' 'Annales de Chimie,' 1812, t. lxxxi. p. 37).

268 A. Vauquelin found that the brain yielded two kinds of fatty phosphorized matter, one a *white* substance equal to 4·53 per cent. of the mass of the brain, and another a *red* fatty substance equal to ·070 per cent. The whole quantity of oxydizable phosphorus contained in cerebral matter amounts, according to Vauquelin, to 1½ per cent. In order to establish that the phosphorus contained in nervous matter really existed in an oxydizable condition, Vauquelin proved that before calcination the purified nervous matter showed, under the use of proper reagents, no traces of phosphoric acid, while it did after calcination.

Couerbe.

269. In 1834 Couerbe, another French chemist ('Annales de Chimie et de Physique,' t. lvi. p. 164), found that the brain contained four different fatty matters,

to which he gave the names of *stéaroconote*, *céphalote*, *éléencéphol*, and *cérébrote*. He found that in each of these principles phosphorus existed in an oxydizable condition, and to it he attributed the chief agency in nervous action, where it acted as an exciting element. He even went so far as to say, 'The want of phosphorus in the brain would reduce man to the sad condition of the brute; an excess of this element irritates the nervous system, excites the individual, and throws him into that terrible state of disturbance called madness, or mental alienation; a moderate proportion gives rise to the sublimest ideas, and produces that admirable harmony which spiritualists call the soul' (Ibid. p. 191).

Fremy.

270. In 1840 Fremy, another French chemist, took up the question again ('Comptes Rendus de l'Academie des Sciences,' t. ii. p. 765; 'Journal de Pharmacie,' 1841; and 'Annales de Chimie et de Physique,' t. ii. p. 463), and, from the results of his analyses, concluded that the brain only contained two phosphorized principles, which he called oleophosphoric and cerebric acids or cerebrine. According to him, oleophosphoric acid is simply a copulated body, composed of phosphoric acid and oleine. Cerebric acid is the same white phosphorized matter discovered by Vauquelin. According to Fremy, the four fatty phosphorized bodies found by Couerbe resulted from a mixture of oleophosphoric acid and cerebrine, with variable proportions of albumen and cholesterine.

Lhéritier.

271. In 1842 another French chemist, Lhéritier ('Traité de Chimie pathologique,' Paris, p. 596) again investigated the chemical composition of the brain by the same method as Vauquelin, and found that the proportion of phosphorus was larger in the adult than in the adolescent, larger in the latter than in the aged. In infants it was less than at any other age, and in the idiotic fell as low as in the infant, thus confirming the results stated by Couerbe.

Gobley. 272. In 1850 Gobley, a French chemist ('Journal de Chimie medicale,' 1851, p. 577; 'Journal de Chimie et de Pharmacie,' 1850, t. xvii. p. 408), found in the brain a fatty matter, which he called *lécithine*, and which he considered to be identical with the fatty phosphorized matter found in fibrine by Chevreul (274).

Von Bibra. 273. In 1853 Von Bibra published a Memoir, in which he gave an account of his researches on the chemical composition of the brain (Liebig, 'Annal.' Bd. 85, p. 200; and 'Vergleichende Untersuchungen über das Gehirn des Menschen und der Wirbelthiere,' Mannheim, 1854). He made use of Fremy's method for separating cerebric acid from the other fatty matters. According to him, the mean proportion of phosphorus was 0·052, while Fremy had found 0·9. Its state in the brain was that of phospho-glycerate of ammonia. There was less cerebric acid in the grey matter than in the white. The proportion also was smaller in the fœtus, in new-born children, and in the inferior animals. The proportion of phosphorus contained in the fatty matter was found by him to be the same in man, in mammiferous animals, and in birds, and might vary in proportion between the limits of 0·01 and 0·03. Contrary to what had been stated by Couerbe and Lhéritier, he found that this same proportion of phosphorus existed in the insane, in the aged, in infants, and in the embryo. The fat extracted from the grey substance of the brain contained more phosphorus than that extracted from the white substance. The phosphorus contained in the brain was to be met with in two different forms, that of cerebric acid and that of a special fatty matter containing phospho-glycerate of ammonia, and its variations depended upon the varying quantities of this latter.—Von Bibra, Ibid., and Scherer in Canstatt's 'Jahresbericht,' 1854, Bd. i. S. 120).

Phosphide element in the blood. 274. The two fatty phosphorized substances discovered in the brain have also been found in the blood.

Chevreul. 275. As far back as 1827 the *white* fatty phosphide substance discovered by Vauquelin was found there by the celebrated French chemist Chevreul, either mixed or combined with fibrine. ('Dictionnaire des Sciences naturelles,' t. xlvii. pp. 187, 188; 'Annales du Muséum d'Histoire naturelle,' t. x. p. 443.)

Denis. Boudet. Lecanu. Gobley. 276. This has since been confirmed by Denis ('Recherches expérimentales sur le Sang humain,' Commercy, 1830, p. 102); by Félix Boudet ('Thése soutenue à l'École de Pharmacie,' July 5, 1833, 'Journal de Pharmacie,' 1833); by Lecanu ('Journal de Pharmacie,' t. xvii.); and by Gobley ('Sur les Matières grasses du Sang,' 'Journal de Chimie médicale,' 1851, p. 577).

Denis. 277. The *red* phosphide matter discovered by Vauquelin in the brain was likewise found by Denis in 1830 to exist also in the blood.

Owen Rees. 278. In 1848 Owen Rees ('On a Function of the Red Corpuscles of the Blood, and on the Process of Arterialization;' Brewster's 'Philosophical Magazine,' No. 219) published the results of a series of researches, by which he endeavoured to establish that phosphorus exists in the globules of venous blood combined with fatty matters and the hæmatosine, that it gets oxydized by contact with the air in the pulmonary cells, and is thus transformed into phosphoric acid, which in its turn, by combining with the base of the soda salts contained in the serum, produces the change of colour characteristic of arterial blood.

Becquerel and Rodier. 279. In 1844 Becquerel and Rodier ('Recherches sur la Composition du Sang,' Paris, 1844, p. 110) endeavoured to determine the proportions of fatty phosph*ide* matter contained in the blood in its normal and in its diseased states, and although they afterwards thought the results which they had arrived at were erroneous, their analyses are so remarkably confirmative of my theory of *phospholigy* that they will be specially examined further on. Appendix I. and 353.

Phosphide element in proteic substances. Mulder.

Liebig.

Moleschott Lœwig.

280. In 1849 Mulder (Mulder's 'Chemistry of Vegetable and Animal Physiology,' p. 302; see also Robin and Verdeil 'Chimie anatomique' *passim*) brought forward his theory of protein, according to which the albuminous compounds--albumen, fibrin, casein—were made up of a proximate principle which he called protein, combined with variable proportions of sulphur and phosphorus. Thus albumen of the serum consisted of 10 protein, 2 sulphur, and 1 phosphorus; fibrin, 10 protein, 1 sulphur, and 1 phosphorus; casein, 10 protein, 1 sulphur, and no phosphorus. Later researches, particularly by Liebig and his pupils, have not confirmed the existence of protein as a distinct proximate principle; but the results of the analyses hitherto made manifestly establish the existence of phosphorus in the albuminoid bodies. The special state of this phosphorus is the point in dispute. Liebig and his disciples ('Chemische Briefe,' pp. 501, 598, 599) hold that the phosphorus contained in the albuminoid compounds exists either in the form of phosphoric acid or of a phosphate (Gregory's 'Handbook of Organic Chemistry,' p. 419), while Mulder, Moleschott ('Der Kreislauf des Lebens,' p. 152), and Lœwig assert that it exists in a molecular or oxydizable condition.

In the muscles of fishes. Fremy and Valenciennes.

281. Besides its presence in the albuminoid substances and in the fatty matters of the brain, phosphorus has been shown by Fremy and Valenciennes to exist in a molecular or oxydizable condition ('Comptes Rendus de l'Académie des Sciences,' t. xxxviii. p. 472) in ichthine and ichthuline, which are proximate principles contained in the muscular flesh of fishes (*loco citato*, p. 571).

In the yolk of egg. Gobley.

282. Gobley ('Journal de Pharmacie,' 3e série, t. ix. p. 19) found that the lecithine he had discovered in the brain also existed in the yolk of egg;

283. Though this has since been denied by Baumhauer ('Scheidkundigen Onderzækingen,' Deel. iii. p. 272).

In spermatozoa. Frerichs. 284. Molecular or oxydizable phosphorus has also been found in the spermatozoa by Frerichs ('Cyclopedia of Anatomy and Physiology,' vol. iv. pt. i. p. 506);

Ronalds. 285. And by Ronalds, in the colouring matter of the urine ('Philosophical Transactions,' 1846, pp. 441, 461, 464).

Chemical difficulties. 286. The difficulty of deciding the exact state in which phosphorus exists in these compounds is owing to the fact that it cannot be separated from its combinations without destroying them entirely by means of oxydation, thus leaving it uncertain whether the phosphorus found in the analysis as phosphoric acid was already oxydized before the process, or by it. At p. 818 of my book, 'De la Cause immédiate de la Phthisie,' &c., Paris, 1864, will be found a process according to which, by means of the double chloride of palladium and sodium, Emile Rousseau and myself had endeavoured to solve this problem.

Function of the phosphide element unknown. 287. The function of the phosphide element in the system is as uncertain as its true anatomical and chemical composition, and is still more obscure than the function of the phosphatic element. Until my researches on the subject, the phosphatic element was the only one taken account of by pathologists. The very existence of the phosphide element as a distinct form was held to be doubtful, and no pathological inference or therapeutical indication had ever been drawn from it. It had not, however, altogether escaped the attention of physiologists.

Carpenter. 288. Twenty years ago Carpenter ('Principles of Human Physiology,' 5th edition, London, 1855, pp. 592 and 424) pointed out that the phosphates in the system result at least in part from the oxydization of the phosphorus contained in the albuminoid bodies.

Draper. 289. Draper in his treatise ('Human Physiology,' New York, 1856, pp. 272 et seq.) also enters into the chemical history of the subject.

Clarus. 290. And lastly, Clarus, in his treatise on Therapeutics ('Handbuch der Heilmittellehre,' 2te auf. Leipzig, 1856, p. 119), says:—'Several animal substances contain phosphorus in an oxydizable condition, and are only eliminated after being previously decomposed and oxydized;' but he draws no practical conclusion from this fact.

Longet, in his learned treatise on Physiology, says nothing on the subject, and it is hardly mentioned by Robin in his celebrated 'Chimie anatomique.'

Present views. 291. Since I called attention to the important function in the system of the phosphide element, and particularly since the hypophosphites have come into such general use, and thus given a practical proof of the soundness of my doctrines, the subject has again attracted the attention of chemists and physiologists, and the following extract from Thudichum's 'Manual of Chemical Physiology' (1872) gives the most recent ideas on the subject. At p. 40 he says:— **Thudichum.**

'The chemical constitution of these matters is *perhaps the greatest problem of organic and physiological chemistry*. A consideration of all researches since the time of Vauquelin tends to show that brain matter is constituted similarly to the hæmatocrystalline of the blood; that it contains an albuminous matter, to which is combined a substance containing nitrogen and phosphorus; that its molecule must, therefore, be very complicated and large; and that the matters hitherto extracted from the brain are at the most detached proximate nuclei, or single stones broken out of the mosaic picture, which its molecule may be imagined to represent. The principal one of these detached nuclei is a body of which a small quantity can be extracted from brain matter by boiling alcohol, and which has been variously termed brain-wax, brain-fat; but by Fremy, who first obtained it pure and determined its composition, was found to be an acid, and termed cerebric acid. Lately Liebreich having examined the same substance, gave it the name of protagon, but without any valid reason. This cerebric acid appears in crystalline needles, and gives remarkable reactions. By decomposition it yields fatty acids, glycero-phosphoric acid ($C_3H_9PO_6$) containing the whole of its phosphorus, neurine ($C_5H_{13}N$), choline ($C_5H_{15}NO_2$), and cerebrine ($C_{17}H_{33}NO_3$). This reaction makes it probable that it is proximately composed of cerebrine and lecythine ($C_{42}H_{84}NPO_9$), which latter yields the products last mentioned by the following reaction:—

$$\underbrace{C_{42}H_{84}NPO_9}_{\text{Lecythine}} + 3H_2O =$$

$$\underbrace{C_3H_9PO_6}_{\substack{\text{Glycero-}\\\text{phosphoric acid}}} + \underbrace{C_5H_{15}NO_2}_{\text{Choline}} + \underbrace{C_{18}H_{32}O_2}_{\text{Oleic acid}} + \underbrace{C_{16}H_{22}O_2}_{\text{Margaric acid}}$$

Much of it is contained in the brain in a state of such firm combination that even concentrated sulphuric acid does not easily set it free.'

My views in 1858. 292. Nearly seventeen years ago, in a memoir read before the Academy of Sciences ('Mémoire sur le Traitement de la Phthisie pulmonaire et sur l'Action physiologique et thérapeutique des Hypophosphites,' lu à l'Académie des Sciences le 31 Mai, 1858, 'Comptes Rendus,' tome xlvi. p. 1040), I laid down the following conclusions:—

'Independently of the phosph*atic* element, chiefly in the form of phosphate of lime, which has been repeatedly studied by other physicians, the animal system contains another proximate principle, in which the phosphorus exists in an oxydizable condition.

'This has been ascertained by the researches of different chemists, particularly those of Vauquelin and Fremy on the brain. This proximate principle fulfils a special function both with regard to innervation and to hæmatosis, and will thus perhaps account for the intimate connection which several physiologists, particularly Claude Bernard, have shown to exist between innervation, or nerve force, and the phenomena of general nutrition, such as calorification, &c. This conclusion is based not only upon the therapeutical results I have already reported, but upon the remarkable effects produced by the use of the hypophosphites in many morbid states, characterised by a disturbance of innervation, or general nutrition, such as chronic bronchitis, asthma, spermatorrhœa, myelitis, anæmia, rickets, the wasting produced by pregnancy or excessive lactation, and above all by the remarkable influence which my experiments have shown them to have in promoting the growth of young animals. A year ago, in a memoir read before the Academy of Medicine, I pointed out the importance of this phosph*ide* element as distinguished from the phosph*atic*, and the connection which might be supposed to exist between the variation of its quantity in the system and different morbid states, particularly the tubercular diathesis. This is the first time that any pathological or therapeutical induction has been drawn from the existence in the system of phosphorus in an *oxydizable* condition, and above all, the first attempt that has been made to demonstrate experimentally that whenever it might be supposed to be deficient there was a rational means of restoring it to the system by the administration of a preparation of phosphorus uniting the two characters of being assimilable and oxydizable, as is the case with the hypophosphites. The results to which I thus briefly refer, are more fully detailed in the work I have presented to the Academy [the first edition of my French work], and are the starting-point of the paper which I now deposit. They are a deduction from a general doctrine of physiological therapeutics which I shall bring forward at a future time.'

Therapeutic use of oxydizable phosphorus.

293. The following is a brief history of the therapeutic use of the phosph*ide* element or oxydizable compounds of phosphorus.

Simple phosphorus. Kunckel.

294. Kunckel, who stole the process of preparing phosphorus from Brandt, was the first who prescribed phosphorus in medicine; he composed pills of this substance, which were luminous in the dark, and prescribed them against a number of chronic complaints, of which he published an account in 1721. His example was followed in 1733, by Kramer, by Mentz, and by a great many other physicians, chiefly German. The medical journals contain a great number of observations of cures of diseases effected by this means, such as fevers, nervous complaints, diseases of the bones, and chronic diseases of the respiratory organs. In spite, however, of this success, the internal administration of phosphorus is so highly dangerous that it was almost entirely excluded from medical use. Within the last four or five years it has, however, again been revived by practitioners, who, seeing the effects produced by the hypophosphites, prefer doing a thing badly or not doing it at all, to following the example of a contemporary. This is too often the case in medicine (111, 112, 474).

Coindet.

295. As early as 1802 Dr. Coindet, a physician of Geneva, to whom we owe the introduction of iodine into medical practice, successfully prescribed phosphorus in two cases of tubercular meningitis (51). The phosphorus was given dissolved in oil, but, says Coindet, 'the preparation and administration of this remedy require too much care and attention for it ever to come into general use.'—'Mémoire sur l'Hydrocephale,' 1817, p. 211.

Barthez and Rilliet.

296. Barthez and Rilliet (1854) also tried the use of phosphorus in tuberculosis, but, as they say, without any result whatever.—'Maladies des Enfants,' t. iii. p. 526.

Thompson.

297. Theophilus Thompson, physician to the Brompton Hospital (Clinical Lectures on Pulmonary Consumption,

'Lancet,' vol. ii. 1851), thought that phosphorus might be useful in consumption, because, according to Owen Rees (278), this element is met with in the blood corpuscles. The phosphorus was given dissolved in oil as Coindet had done; in several cases there was an improvement which only lasted for a time, so that Dr. Thompson gave up the treatment.

C. J. B. Williams. Thorowgood.

297 A. Since my discovery, the experiment of using phosphorus in phthisis has been tried over again by C. J. B. Williams and Thorowgood, but with no better results (474).

I have shown the cause of this inefficiency of phosphorus (51, 112 D).

Phosphorous acid and the phosphites.

298. The effects of phosphor*ous* acid upon the animal system have been investigated by several physiologists, but only with a view to study its *poisonous* effects.

Hunefeld.

299. Hunefeld, a German physician in 1830, tried its effects upon a rabbit, which died in 12 hours after taking 60 grains of the acid.—Horn's 'Archiv. für Medicinische Erfahrung,' Numbers for September and October, 1830, p. 861.

Upon animals. Weigel and Krug.

300. In 1844 Weigel and Krug investigated the difference between the action of phosphor*ic* acid *when pure*, and that of the impure or commercial phosphor*ic* acid, which always contains phosphor*ous* acid. They found that a rabbit was killed in one hour and a half by 45 drops of phosphor*ic* acid containing only one tenth of phosphor*ous* acid, another rabbit was killed in four hours by only 30 drops of the same acid.—Casper's 'Medicinische Wochenschrift,' 1844, p. 455.

Woehler and Frerichs.

301. The same result was obtained by Woehler and Frerichs on different animals. A pigeon died in an hour after taking a solution of 7 grains of anhydrous phosphorous acid; a cat died in 36 hours after taking a solution containing 15 grains of acid.

Sawitsch.

302. In 1854 Basilius Sawitsch repeated these expe-

riments but with different results ('Meletemata de Acidi arsenicosi efficacia,' Dorpat, 1854). Fifteen grains of phosphorous acid dissolved in 75 grains of water, and representing somewhat more than 7 grains of anhydrous acid, injected into the stomach of a cat produced some vomiting but no other effect; another dose of double the quantity produced a repetition of the same effect. On May 3, 1854, Sawitsch himself took 33 grains of phosphorous acid, an equivalent to nearly 16 grains of anhydrous acid, in sweetened water, and divided into two doses at a quarter of an hour's interval. On May 5 he took in the same manner 41 grains of phosphorous acid, equal to 23 grains of anhydrous acid. There was no marked effect, nor was there any result produced upon cats by the phosphite of soda.

Buchheim. 303. Professor Buchheim of the same University of Dorpat, also tried phosphite of soda upon himself, but without any poisonous results.

Schuchardt. 304. Schuchardt, another student of the same University, tried the phosphorous acid upon rabbits with similar results. ('On Acute Poisoning by Phosphorus,' see Schuchardt in 'Henle's und Pfeufer's Zeitschrift für Rationnelle Medicin,' Bd. vii. 3 Heft, S. 235.)

Rowbotham. 305. These facts all refer to the physiological and toxical or poisonous action of phosphorous acid. The only medicinal fact upon record on the subject is one referring to a case of asthma treated by Dr. Rowbotham ('Lancet,' July 18, 1857). The quantity of acid given is not stated.

Hypophosphorous acid and hypophosphites. Sawitsch. 306. The facts relative to hypophosphorous acid and its salts known before my discovery of their curative action in phthisis are still less numerous than the preceding. Sawitsch, in the thesis just quoted (302), reports four experiments, two upon a cat, and two upon himself. The first time the cat received 15 grains of acid, equal to 4¼ grains of anhydrous acid. The second dose was double that quantity. No effect except slight vomiting was produced. On May 7, 1854, Sawitsch took a solution containing 6 grains of anhydrous acid, and 2 days after another solution containing 9 grains, both without any apparent effect.

Dr. Buchheim also tried upon himself the hypophosphite of soda, and arrived at the conclusion that the physiological action of the three acids of phosphorus, the hypophosphorous, the phosphorous, and the phosphoric, was the same. ('Lehrbuch der Arzneimittellehre,' p. 320. Leipzig, 1854.) 'It is evident,' says he, 'that phosphoric acid does not act on the system by disoxydizing itself, for it does not produce the same effects as phosphorus. It had been supposed that this latter body was transformed into one of its lower oxygenized combinations, either the hypophosphorous or the phosphorous acid, and that it was in this way that it acted upon the system. This was the opinion of Woehler and Frerichs, founded upon their own experiments (300), as also upon those of Weigel and Krug (301), from which they had come to the conclusion that phosphorous acid *was as poisonous as arsenious acid.* Sawitsch's experiments and my own have shown that phosphorous and hypophosphorous acids when perfectly pure have the same action upon the system as phosphoric acid, and only become dangerous under the same circumstances as the latter. The same holds good of their soda salts, which may be taken in somewhat large doses, without producing any great disturbance of the system. Hence I conclude that phosphorus acts on the system as a simple body, and not after transforming itself into one of its oxydized compounds.' **Buchheim.**

We have seen (53) that Orfila and Devergie were also of opinion with Woehler and Frerichs and Weigel and Krug that the poisonous effects of phosphorus were due to its previous transformation, in the system, into hypophosphorous and phosphorous acids.

At the present day it is well known that hypophosphorous acid and the hypophosphites have an altogether different action upon the animal system from phosphoric acid and the phosphates, and that phosphorus when taken in very minute and carefully administered doses may become transformed into hypophosphorous or phosphorous acid, before it is assimilated, and act in the same manner upon the system. As soon, however, as these very minute doses are exceeded, the phosphorus is absorbed without being partially oxydized, and then manifests its highly poisonous effects (474).

Experiments on myself. 307. At the time I began my researches (52) for the specific remedy of phthisis at Havannah in 1855, I was not acquainted with the experiments of Sawitsch and Buchheim, which had only been published in Europe a few months before; and before administering the hypophosphites to my patients I tried them upon myself. The current opinion at the time, we have just seen, was that they were highly poisonous, in fact as poisonous as arsenic (306). I therefore began with ½ a grain of hypophosphite of lime, which I gradually increased, until I found that I was able to take 6 grains at one dose without any injurious effect (53). It was then I determined to give it to my first patient.

Previous to my discovery of their medicinal action there is no record of the hypophosphites having ever been used medicinally. But the 'Pharmacopée usuelle de Van Mons' (Louvain, 1821, 1822) contains a formula for the preparation of a phosphorized tincture of salts of tartar, made by dissolving phosphorus in an alcoholic solution of cream of tartar, which gives an impure hypophosphite of potash. Van Mons' book is full of theoretical formulæ, of which this is one. It is likely that it was never used, as it would produce the same poisonous effects upon the system as phosphorus itself, because, independently of hypophosphite of potash, it contains phosphide of ethyl, and also the bi- and tri-hydric phosphides indicated by Janssen.—'Répertoire de Chimie,' p. 393, 1861.

307 A. What precedes shows the importance in medicine, as in all other sciences, of the use of a theory, and above all of a method of research.

If facts alone, without any interpretation or connection, were sufficient to establish a science or to lead to practical results, there was already enough known to point to the conclusions which I myself discovered. But although other experimenters, Coindet, Barthez and Rillier, Theophilus Thompson, Baumes, Larcher, Beneke, Mouriès, Kœnig, and long before them, Lentin, Göden, and Simeerling, had advanced more or less towards the goal, they had all, after trying, turned back and declared there was no road that way. In Chapter III. I have explained how I was able to avoid these mistakes (49—53).

308. As one or two of my adversaries have latterly gone so far as to suggest or insinuate a doubt as to the originality of my discovery, I think the following conclusions will be found to be a fair summary of what precedes (249, 491). **Conclusions.**

At the time of my researches on the treatment of phthisis by the hypophosphites, the existence of phosphorus in the animal system in the *phosphatic*, that is, in the completely oxydized state, was universally admitted by chemists; but whether it existed as a *phosphide* element, that is, in an oxydizable condition, was, and, in fact, to a certain extent still is, a point in dispute.

Owing to this uncertainty, while the function of phosphorus in the first form (phosphatic) was to a certain extent known, its function in the second state is hardly alluded to in treatises of physiology and organic chemistry. Previous to my researches, different pathologists, and above all Larcher and Beneke, had, it is true, sought for the cause of the tubercular diathesis in the want of phosphorus in the system, but they attributed it to a want of the phosph*atic* element, that is, of the phosphorus existing in the system as phosphor*ic* acid or phosph*ates*. Twenty-five years' experience has solved this problem. It is now known that the phosphate of lime has no special action against tuberculosis. Since his first papers on the subject, Beneke himself has published nothing further in support of his views. Kletzinski has since shown that the phosphate of lime given in conformity with these views of Beneke, Mouriès, and Kœnig, is not retained and appropriated by the system; and after him Hegar proved, that if in some cases it was retained, it was simply because the food was deficient in phosphate *of lime*. The therapeutical indications, to which Larcher, Beneke, Mouriès, and Kœnig were led previous to my researches had, therefore, exclusive reference to the phosph*ate* of lime, that is to say, to that form of phosphorus contained in the system where it is completely oxydized, and which I have called the phosph*atic* element.

With regard to the therapeutical use of the different oxydizable forms of phosphorus, it is true that phosphorus in its simple state had been empirically used against phthisis, and been found useless, by a few practitioners, such as Coindet, Barthez and Rilliet, and Theophilus Thompson, in the same way as almost every substance of the *materia medica* of any great power had been tried in turn (See Appendix II.). With the exception of the two cases of meningitis reported by Coindet, and already mentioned (295), not a single case of cure of tuberculosis and not one of consumption by free phosphorus has been recorded in the annals of medicine since its discovery by Brandt more than two hundred years ago.

The reader has already seen the reason of this inefficiency of phosphorus in its free state (51, 112A, 112 D).

308 A. The validity of my discovery, therefore, is based upon the following points:—

I. It was the first pathological deduction from the possible existence in the system of a phosph*ide* proximate principle, that is to say, a principle containing phosphorus in an oxydizable condition.

II. It was the first inductive hypothesis that tuberculosis might be the consequence of a state of *phospholigy*, that is, of a deficiency in the system, not of the oxydized or phosph*atic* principle, as supposed by Larcher, Beneke, Kœnig, and Mouries, but of the *un*oxydized phosphorus or phosph*ide* principle.

III. It was the first experimental demonstration that when this phospholigic cachexia might be supposed to exist, the rational way of removing it was the administration of a compound of phosphorus, which should be both *assimilable* and *oxydizable*, a two-fold property which belongs neither to phosphor*ic* acid or the phosph*ates*, nor to free phosphorus.

IV. It proved experimentally that the hypophosphites fulfilled these two conditions, by showing that they have most of the chemical properties of phosphorus and all its physiological action, while they produce none of the toxical or destructive effects which result from its physicochemical action on living tissues, and which have made its use obsolete in medicine.

V. It demonstrated by an ample array of clinical observations that the hypophosphites are the remedial and prophylactic 'specific' of the tubercular diathesis.

CHAPTER VIII.

THEORY OF TUBERCULOSIS.

Necessity of theories in medicine. 309. In a preceding chapter I have explained the hypothesis from which, as a stand-point, I endeavoured to discover the specific for tuberculosis. I have shown the practical deductions drawn from it, and I have given the therapeutical and clinical phenomena, as well as the curative results produced by the new mode of treatment. I might have rested here, and by so doing should merely have obeyed the actual tendency in medical science, that of collecting and registering facts, without any, or with little attempt, at a co-ordination or discussion of them. For many years it has been the boast of physicians that modern medicine is essentially a matter of fact and observation, and nothing more. If we compare this with what we see in other and more advanced sciences, such as astronomy, physics, and chemistry, we find on the contrary that their progress is always effected by means of a two-fold development, that of theories leading to facts, and facts pointing to theories of ampler scope than those from which the facts themselves were derived. Such is the invariable course of all scientific evolution, and medicine itself is no exception to the rule. But it happens with medicine, as with other things, that those who are engaged in the business or conflict of the hour are too busy, too indolent, or too ignorant to know what has gone before, or to think of what may come after. As the present phasis of medicine is and has been for the last fifty years the one occupied with the collection of facts, physicians are apt to think that it always has been and always will be so. The phenomena, of which account must be taken in medical practice, are at once so numerous, so minute, frequently so evanescent, that few minds have sufficient grasp to retain them, or sufficient power of condensation to bring them, so to speak, into the focus of one primary idea.

The advantage of a theory is, that, like a string run through a number of beads, it enables us to bring facts together, to perceive at a glance their agreement or their difference, and thus get a connected view of what would otherwise be nothing but incoherence and confusion. No doubt physicians at one time erred by basing their practice upon theories supported by too slender a substructure of facts. At the present day they err equally in the opposite direction by sticking closely to facts and, as they suppose, by rejecting theory altogether. In truth, however, it will be found that the man who acts upon the assumption that he follows no theory at all, is invariably influenced by several, perhaps by a special, different, and contradictory theory for every individual fact. Science can no more progress without the double and alternate support of fact and theory than a man can walk without both his legs, or, as the celebrated French philosopher St. Simon pithily expressed it, 'Theory and practice are like the up-and-down movement of the pump-handle. When the piston is in the lower part of the pump the handle must be depressed, when it is in the upper part the handle must be raised.'

Former theories of tuberculosis.

310. As was said in Chapter III. (46, 47), the opinions as to the nature of tuberculosis which have prevailed at different periods in medical science are very numerous indeed, and the following abridged and classified summary of them will be found interesting, not only in an historical point of view, but also as showing how invariably every opinion which gains a hold upon men's minds, contains its

modicum of truth, and only fails because this truth is partial instead of being complete. In order to simplify and abridge this account, the different opinions, which have been chiefly taken from Ancell, have been classed according to their logical connection or sequence. (Young on 'Consumption,' Ancell on 'Tuberculosis,' Sprengel, 'Histoire de la Médecine.') The figures indicate the date at which the author lived.

Physiological or vitalist doctrines.

311. *A.* Tuberculosis is a mixture of strictum and laxum. (Cœlius Aurelianus, A.D. 230.)

A mixture of the sthenic and asthenic diathesis. (Brown, 1780.)

B. Tuberculosis is a chronic inflammation. (Broussais, 1804.)

C. Tuberculosis depends upon weakened vitality of the blood. (Christopher Bennet, 1654.)

A depraved state of the blood. (Norton, 1680.)

A transformation of the blood into *pus.* (Boorhaave, 1709; De Haen, 1761: Cruveilhier, 1840.)

D. Tuberculosis is owing to imperfect pulmonary hæmatosis. (Baudelocque, 1834; Parola, 1849.)

E. Tuberculosis is a kind of putrefaction. (Van Swieten, 1741.)

F. Tuberculosis depends upon a poison or contagious matter. (Aristotle, B.C. 384.)

Tuberculosis is a special blood-poison. (Madden, A.D. 1847.)

G. Tuberculosis is a special diathesis distinct from the inflammatory condition. (Tommasini, 1817.)

H. Tuberculosis depends upon a primitive weakness of the organism. (Rush, 1793.)

Upon a primitive organic defect of the system. (Ambri Bettoli, 1830.)

An exhaustion of the vital force, consequently of organic assimilation, of hæmatosis and nutrition. (Padlini, 1835.)

A disturbance of the nervous system; a peculiar state of the vital power. (J. C. Holland, 1850.)

A disturbance of the organic nervous influx. (Copland, 1852.)

Solidist or anatomical doctrines.

312. *A.* Tuberculosis is a weakness of the absorbents (Soemering, 1795.)

An atony of the lymphatic system. (Hufeland, 1797.)

An atony of the lacteals; an exaggeration of the lymphatic system. (Cavanis, 1804.)

A deficiency in the absorbing power of the mouths of the absorbent and lacteal vessels. (Gilbert, 1842.)

B. Tuberculosis is an abscess of the lungs. (Aretæus, 81.)

C. Tuberculosis is a degenerescence of the pulmonary glands. (Silvius de la Boe, 1650.)

Of the lymphatic system. (Girtanner, 1800.)

D. Tuberculosis is a disease of the sanguineous and specially of the capillary system. (Giacomini, 1820.)

E. Tuberculosis is produced by animalculæ in the lungs. (Martin, 1722; Raspail, 1840.)

Tubercles are nothing but hydatids. (Barron, 1819.)

Tubercle is produced by a peculiar entozoon. (Carmichael, 1836.)

By a phytozoon. (Lanza, 1849.)

F. Tubercle is a special substance. (Bayley, 1795.)

G. Tubercle is an arrest of development, or a retrogressive transformation of the primitive cells. (Addison, 1849.)

H. Tubercle consists of the products of inflammation. (Reinhard, 1840.)

I. Tubercle consists of dead histological elements. (Henle, 1840.)

Tubercle is a badly or half-organized product. (Perroud, 861.)

K. Tubercle consists of transformed organic elements which have undergone fatty degenerescence. (Virchow, 1860.)

L. Tubercle consists of abnormal epithelial cells. (Addison, 1849.)

Secreted by the epithelial membrane of the lung cells. (Schroeder Van der Kolck, 1853.)

Humoral or chemical doctrines.

313. *A.* Tubercle depends upon a lymphatic temperament or upon the exudation of morbid matter. (Hippocrates, B.C. 432.)

B. Tubercles are certain glutinous matters which get thickened in the lungs. (Galen, A.D. 180.)

C. Scrofula depends upon a gross cold and viscous humour mixed with atrobile. (Ambrose Paré, 1579.)

D. Phthisis depends upon an acrid matter engendered in the lungs or in the blood. (Sennert, 1627; Thomas Willis, 1660; Wiseman, 1676; Sydenham, 1680; Charmetton, 1752; Bordeu, 1760; Cullen, 1777; White, 1788; Hufeland, 1797.)

E. Phthisis depends upon the want of gluten (gelatine?) in the blood. (Sutton, 1799.)

F. Phthisis depends upon the acidity of the digestive passages. (Carmichael, 1836.)

G. Phthisis consists in a diminished vitality of the blood. (Christopher Bennet, 1654.)

H. Scrofula is a general disease of the nutritive juices. (Bordeu, 1760.)

I. The scrofulous constitution depends upon a disturbance of nutrition, whence an etiolation of all the organic tissues. (Le Pelletier, 1816.)

J. In scrofula the blood is imperfect, whence it follows that all the tissues are repaired with defective elements. (Baudelocque, 1833.)

K. Tubercle is a degenerated state of the nutritive matter. (C. J. B. Williams, 1836.)

L. Tuberculosis depends on an alteration of the lymph in the interior of the vessels. (Andral, 1829.)

On the imperfect development of the chyle or lymph. (Schultz, 1843.)

On an arrest of development in the proteic matter of the blood and lymph. John Simon, 1850.)

M. Tuberculosis depends on a superabundance of albumen. (Parr, 1809.)

Upon the degenerescence and consequently the formation of an abnormal albumen. (Todd, 1829; Canstatt, 1841.)

N. In tuberculosis there is a superabundance of albumen with arrest of ulterior change, in consequence of an imperfection in the respiratory function, so that the albumen cannot be transformed into higher organic products. (Bufalini, 1846.)

O. Tuberculosis is a disturbance of the relation between the albuminous and the fatty principles. (Hughes Bennett, 1847.)

P. Tuberculosis is a special modification of the fibrin, chiefly that of the arterial system. (Rokitanski, 1846; Carpenter, 1847.)

Q. Tuberculosis depends on a deficiency of the respiratory, cutaneous, or pulmonary functions, which allow the sojourn in the blood of abnormal products which end by being deposited in the different tissues. (Fourcault, 1844.)

R. Tubercle contains as a constituent element a proteic compound, which shows the greatest analogy with casein, if it be not casein itself. (Ancell, 1852.)

S. Consumption depends on a deficiency of oxygenization, and scrofula upon an excess of oxygenization. (Beddowes, 1798; MacCormack, 1855.)

T. Tuberculosis depends on too great activity of oxygenization. (Weber; Liebig, 1850.)

U. Scrofula depends upon a too great abundance of the phosphoric acid principles. (Baume, 1783.)

V. Tuberculosis depends on a deviation of the earthy matter, and above all of the phosphatic matter of the bones. (Dupuis; Larcher, 1829.)

W. Tuberculosis depends on the want of phosphate of lime in the system. (Beneke, 1849; Kœnig, 1852.)

Comparison of these.

314. If we take the common points of these different doctrines, omitting their accidental divergences, and have regard to their logical connection, rather than to their historical development, we shall see that the idea of tuberculosis, which is the outcome of the study and meditation of physicians from the earliest appearance of medicine, may be referred to three different conceptions, each of which, in the sphere of phenomena which it embraces, shows a continually increasing degree of precision.

These three conceptions are the following:—

According to the anatomical school tubercle is a retrograde or incompletely developed histological element, incapable of further organization. According to the vitalist or physiological school, the fundamental character of the tubercular constitution is a general weakness of the system, proceeding from a disturbance of innervation and sanguification. According to the humoral or iatro-chemical school the origin of this disturbance and general debility is a special change in the proteic substances of the system, leading to a deposit in different organs of abnormal protoplasm, which can neither undergo assimilative metamorphosis through the action of the capillaries, nor normal excretion through that of the lymphatics.

Their convergence.

315. If we consider these three apparently separate conceptions, we shall find they converge towards the one central idea of a primitive or general impairment of some elementary principle of nutrition, attended with phenomena of asthenia or general debility, and finally leading to an organic alteration of tissue, which is characteristic of the disease. But this once settled, must this primitive impairment of the nutrimentary principles, of the morphotic and generative elements of the system, be looked upon as a final fact beyond which we cannot go, or is it possible, even in the present state of science, to refer it

to some anterior, more elementary, and consequently, still simpler condition, upon which we may have some means of action? This is the point we must now investigate.

Modes of therapeutical action.

316. In Chapter VI. it has been shown that the administration of an oxydizable and assimilable compound of phosphorus under certain determinate, pathological, and therapeutical conditions, has the specific, that is to say, the constant effect of preventing any fresh deposit of tubercular matter (151, 156, 169). This once established, —and if to any reader the evidence of the cases adduced appear insufficient, he may obtain any number more for himself if he will only follow strictly and scientifically the process laid down—it follows that this substance produces in the system some peculiar modification incompatible with the existence of the tubercular diathesis, or, in other terms, that it destroys some one of the essential conditions of this morbid state. Our object is now to seek for an explanation of this mode of action.

Physical.

In the present state of our knowledge the action of a medicinal substance on the animal system can only be referred to one of the three following conceptions. It acts through its physical properties, such as its weight, its heat, &c.; or through its chemical affinities, such as the action of sulphuric acid or nitrate of silver upon living tissues, of oxygen upon the venous blood; or its action is organic, that is to say, special to living tissues.

Chemical.

Organic action.

317. Leaving aside the two first, which are foreign to our purpose, this last mode of action in its turn can only be referred to one of the following modes. Either the substance is itself one of the proximate principles of the system, and belongs to the class of bromatological remedies which comprises all foods, all the elements of the system, and all the proximate principles; or it may take the place of one of these proximate principles, and at least for a while act as its substitute; and thus belongs to the

class of substitutive remedies or stœchiological substitutes; or lastly, it mixes or combines with one or several of the proximate principles of the system, modifies their action, and belongs to the class of toxic or poisonous remedies, which take no part in the normal functions of life, and only act by disturbing, retarding, or destroying them (See Chapter X.).

Proximate principles. 318. It is now established that all living bodies are built up of different substances or compounds more or less complex, called *proximate principles.* These proximate principles act and react physically and chemically upon one another in the system, as if they were chemical unities, and as far as modern research has extended, their reciprocal action seems to be governed by the same laws of chemical affinity and physical condition as the chemical reactions of the simple and compound bodies of inorganic chemistry.

Thus salt, sugar, the white of egg, or albumen, the different fats, are proximate principles.

Phosphorus. 319. Phosphorus is one of the essential elements of the animal system, and, as has been pointed out (98, 99, 257), it very likely is found in two different forms. In one of these forms the phosphorus is completely oxydized; this is what I call the phosph*atic* element. In the other form, which I call the phosph*ide* element, it is still oxydizable. Prolonged clinical experience has demonstrated that a preparation of phosphorus in the phosph*atic* state, that is, completely oxydized, has no direct action on tuberculosis as had been supposed by Beneke and Kœnig (261—263, 313w); and as stated in Chapter III. (50), the knowledge of this fact was what induced me to choose for my first experimental investigation a phosph*ide* compound, that is to say, one in which the phosphorus is in an oxydizable condition.

Now if the existence of the tubercular diathesis is prevented by an increase of the oxydizable phosphorus

Phospholigy.

in the system, we are naturally led to conclude that just as the want of iron in animals is the cause of spanhæmia or poorness of blood, owing to a deficiency of the hæmato-crystalline in the blood globules, of which iron is an essential element, so the want of the *phosphide* element is one of the essential conditions, or, in other terms, a proximate cause of the tubercular diathesis.

Independently of the specific action of the phosphide medication, what other reasons are there which should induce us to admit that the initial stage of tuberculosis is *phospholigy* (from φωσφόρος and ὀλίγος), or the want in the system of the proximate organic principles containing phosphorus in an oxydizable condition?

Inefficiency of chemical analysis to decide the question.

320. Many persons might suppose this could be easily settled by chemical analysis (286). But in the present state of our knowledge it cannot be done—

First, because the best process hitherto known for isolating the phosphide principles, cerebrin or protagon, and phospho-glyceric acid, is complicated and uncertain; next, because they can only be obtained in such small proportions that their quantitative analysis is difficult and uncertain (Robin et Verdeil 'Chimie anatomique,' t. ii. pp. 327, 332, 333); thirdly, because, even if a sufficient quantity of the proximate element itself be obtained, it has been found impossible hitherto to separate the *phosphide* principle from it without previously oxydating it or breaking it up (286). All the attempts hitherto made adequately to analyse the blood of consumptive patients for the determination of this point have failed. At page 730 of my book ('De la Cause immédiate de la Phthisie,' etc., Paris, 1864) will be found full details on this point. It is probably to improvement in spectral analysis that we must look for the solution of this question, and for the opening up of a new field in pathology.

We must therefore seek for proofs of the theory of a phospholigic diathesis in a complete and exhaustive survey of the physiological and pathological bearings of tuberculosis. If we start from the assumption, that the system does contain a *phosphide* organic element, we shall perhaps be able carefully to work out our deductions from that fact, and see whether they agree with what is known of the tubercular disease.

Importance of the proximate principles.

321. The study of the proximate principles of living beings is hardly yet begun. Their number is as yet undetermined. The biological function of most of them is yet undiscovered. Their composition, or, at least, the real grouping of their elements, has hardly as yet been ascertained. Their mutual reactions within the organism are almost entirely unknown, and yet, as I was the first to state ten years ago, it is in the study of these elements that are to be found the bases of future medical science ('De la Phthisie,' Paris, 1864, p. 735).

Stœchiological medicine.

322. *Stœchiological pathology* is the primordial idea which will do for medicine what the theory of gravitation has done for astronomy. It will give us the guiding principle which will unite all the diverging and obsolescent doctrines of the past; will show the common points of truth contained in vitalism, solidism, and humorism, and will enable us to lay a permanent basis, upon which to raise the structure of scientific therapeutics (494).

Classification of the proximate principles.

Among the half-understood and often contradictory facts hitherto ascertained about the proximate principles, there are certain general results which we may take as a starting point. The elements of which living bodies consist are all primitively derived from inorganic matter. But, at first sight, they may be divided into two great classes.

Special organic elements.

323. The first class is composed of the elements carbon, hydrogen, oxygen, and nitrogen, which are, so to speak, common to all biological or living compounds. These may be called the special organic elements.

Inorganic elements.

324. The other class contains bodies such as potas-

sium, sodium, calcium, magnesium, chlorine, fluorine, silicium, sulphur, iron, and phosphorus, which are less uniformly present. Their sphere of action is much more limited, and seems chiefly intended, either by themselves or through their secondary combinations, whether saline or others (carbonates, phosphates, chlorides, &c.), for the purpose of modifying the condition of the special proximate principles composed of the first four elements, and of varying their qualities and affinities according to the different combinations produced between the compounds of the first and those of the second class.

This principle already applied to vegetable life.

Within the last thirty years this view has governed the chemistry of vegetable bodies, and has led to important applications in agriculture. The use of the saline compounds in vegetation has been established and, to a certain degree, elucidated.

Its application to animal life.

For animal life the results obtained are not so far advanced. Liebig was the first to establish the fact that the inorganic elements—that is, those of the second class just pointed out—are the indispensable mediators of all organic functional action; that they are necessary to the assimilation of nutriment by the system; and that life cannot be supported by any substance where they are deficient (Liebig, 'Letters on Chemistry,' Letter XXXIV.). Chossat, Boussingault, and a vast number of other chemists, have followed out this view, Moleschott ('Kreislauf des Lebens,' Mains, 1857, p. 54) goes even further than Liebig, and maintains that no organic cell can be developed without the presence of inorganic substances. We may therefore assume it to be an established fact that the changes which take place during life in the *proper organic* matter (carbon, oxygen, hydrogen, and nitrogen) of living beings are modified and regulated by the inorganic elements. We are therefore led to a special examination of the second class of biological principles, viz. the *inorganic* elements of the system.

Immediate inorganic principles.

325. Among these inorganic principles, some—such as potash, soda, lime, magnesia, the phosphates, carbonates, sulphates, chlorides, &c.—are found in the system as proximate principles, that is to say, they either exist in the same form as in inorganic chemistry, or may be separated from their compounds without breaking them up and destroying their chemical composition. These may be called the *immediate* inorganic principles.

Mediate inorganic principles.

326. Others, on the contrary, such as iron, sulphur, and phosphorus, are mostly, if not always, in a *mediate* state, they are combined molecularly with the proper organic elements, and are, like them, essential integers of the proximate principles.

There is, therefore, a fundamental difference between these two classes of inorganic biological elements. The first always form haloid or saline combinations, of the same type as in the mineral kingdom; the second only exist in the proximate principles in a molecular state, just as the special organic elements themselves (323).

Function of immediate inorganic principles, statical.

326 A. Now it is a very remarkable fact that the inorganic elements of the first of these two classes (325), as they are found in the system, have no affinity for oxygen, either because their affinity for this gas is always very weak, as is the case with chlorine, or because they are already combined in such a form that their affinity for oxygen is completely satisfied. Such is the case with potash, soda, lime, the carbonates, sulphates, phosphates, &c. These elements and their compounds, therefore, take no immediate share in the phenomenon of intra-organic oxydation, which is the primordial fact of all vitality, and are thus without any direct influence upon the primary molecular changes which flow therefrom. When their secondary part in the system is played out, they are excreted in the same chemical form as when fulfilling their functions. Hence we may conclude that these functions are rather of a static than of a dynamic character.

Function of mediate inorganic principles, dynamical.

326 B. On the other hand, the substances comprised in the second class, the mediate inorganic biological elements, have all three as much affinity for oxygen as the proper organic biological elements themselves—sometimes even more. Usually they are only expelled from the system after their affinity for oxygen has been completely satisfied. Hence we may reasonably conclude that, like the proper organic elements, their function is rather dynamic than static, and that, like these organic elements themselves, they bear some direct and immediate relation to the initial phenomenon of all vitality—oxydation.

Impor of oxyda tion.

327. We thus see that the constituent elements of all organized bodies may be divided into two classes—those which have an affinity for oxygen, and those which no longer have any or have none. Now, as oxydation is the primordial phenomenon of vitality, as there is no function, no act of living beings, in which this chemical phenomenon is not either directly or remotely concerned, we shall not be overstepping the limits of legitimate scientific induction by concluding that the importance of the constituent elements of the system is in direct proportion to the strength of their affinity for the vital gas.

Their affinity for oxygen.

328. If we examine the different oxydizable elements contained in the animal system, we see that their affinity for oxygen varies very much. In the present conditions of vitality they may be ranged in the following manner according to their increasing affinity for this gas—nitrogen, hydrogen, carbon, sulphur, iron, and phosphorus.

Their calorific capacity.

329. But there is another consideration which is of equal importance with their tendency to combine with oxygen, that is, their power of producing heat. Heat is both a result and a constant condition of all the molecular actions, which take place in living beings, and above all in animals. Here, however, we find that the power these bodies have of developing heat, by combining with oxygen, does not follow the same scale as their affinity for it.

Phosphorus the greatest heating element.

330. If we class the combustible elements of the system according to their heat equivalent, that is to say, according to the quantity of water which they can raise one degree in temperature by combining with the same quantity of oxygen, we shall find that they rank in the following order (Gavarret, 'Chaleur produite par les Etres vivants,' p. 84):—

Phosphorus 36·072 (Favre et Silbermann, 'Annales de Chimie et de Physique,' 3e série, tomes xxxiv., xxxvi. et xxxvii.; Miller's 'Elements of Chemistry,' London, 1857, part ii. p. 793). Hydrogen 33·808 (according to Andrews), 34·462 (according to Favre and Silbermann). Iron 33·072 (according to Andrews). Carbon 23·696 (according to Andrews), 23·736 (according to Despretz), 24·240 (according to Favre and Silbermann). Sulphur 17·660 (according to Favre and Silbermann), 18·456 (according to Andrews), 20·808 (according to Dulong).

Objection

330 A. So that, among all the oxydizable elements of the system, phosphorus is the one that possesses the highest heat equivalent, and consequently whose reaction upon a given quantity of oxygen will raise highest the temperature of the combining bodies. I know it may be objected that the oxydizable phosphorus of the system is not in a simple state, but is already molecularly combined with other elements, and that we cannot in the present state of science deduce the exact calorific equivalent of a binary or ternary compound from the calorific equivalents of each of its elements taken separately (Gavarret *loco citato*). It is evident, nevertheless, that there must be some relation between these figures, and that the higher the heat equivalents of the composing bodies, the higher will be the heat equivalent of the compound: thus, for instance, the combustion of sulphide of carbon CS^2 only gives 3,400 heat equivalents, while that of the proto-carburet of hydrogen CH_2 gives 14,675. If, as Löwig ('Principles of Organic and Physiological Chemistry,' Philadelphia,

1853, p. 448) has shown, albuminoid compounds treated by potash yield a hypophosphite of potash, we must conclude that the *phosphide* element of the animal system before it arrives at its final saturation with oxygen, and is transformed into phosphoric acid, goes through the same degrees of oxydation as phosphorus itself, when oxydized in water by means of an alkaline body. Whence we have a right to infer that it developes the same quantity of heat, as it is known that a body to reach a certain degree of oxydation always produces the same amount of heat whatever may be the number of intermediate degrees through which it may have to pass (Gavarret *loco citato*).

Importance of the phosph*ide* element.

330 B. From what precedes, we shall be justified in inferring that of all the proximate principles in the animal system, those which contain the phosph*ide* element, that is to say, phosphorus in an oxydizable condition, must have the greatest affinity for oxygen and the greatest calorific capacity, and that they must influence more powerfully than any other compounds the two primary physical and chemical conditions of animal life, particularly among the warm-blooded animals: intra-organic combustion and the production of heat.

When these views were first stated by me upwards of ten years ago, they were hardly understood; at present the function of the phosphide element in the system appears so important, that Liebreich has proposed that the compounds which Fremy had called cerebric or phosphoglyceric acid, should receive the name of protagon, that is to say, the prime mover of the system. This is merely what I stated in my paper to the Academy of Sciences in 1858.

Anatomical differences between the phosph*ide* and the phosph*atic*

331. The importance of the phosph*ide* element thus established, let us see whether, by keeping these conclusions in view, while comparing the localisation in the system of the phosph*ide* and the phosph*atic* elements, and exa-

com-pounds.

mining the organs and tissues where they are severally met with, we shall not be able to throw some light upon their functions and relative value.

Phosphide element an initiator.

331 A. We shall be immediately struck with this fact: the *phosphide* element is specially met with in all tissues and organs whose office it is to initiate vital action. It is found in the nervous and muscular substance, which initiates intellectual or animal activity; in the globules of the blood, whose function it is to enable the external atmospheric medium to react, through them as a vehicle, upon the inmost recesses of the organism; in the primary metamorphic substances albumen, fibrin, &c., which constitute the substratum, the nidus formativus, the blastema or protoplasm of all the tissues, and which, by their molecular actions of integration or disintegration, supply the materials of every vital act; lastly, it is met with in spermatic matter and in the egg, which afford the most characteristic manifestation of all vitality, the production of a new being.

Was I not therefore justified in stating, as I did (‘De la Phthisie,’ p. 740), that the *phosphide* element is probably one of the essential conditions of the vital force, and constitutes one of the primordial chemical elements essential to animal spontaneity? In the present state of our knowledge, it would be difficult to exaggerate the importance of such a proximate element, and impossible completely to foresee the extent or the bearings of the function which it must fulfil in the system. An element which was hardly recognised before my researches were published, the very existence of which at that time appeared to be doubtful to the best chemists, now comes forward and claims the first rank among all the known elements of the body, and, as Dr. Thudichum (in 1872) aptly remarks, ‘the chemical constitution of these matters is perhaps *the greatest problem of organic and physiological chemistry*’—Thudichum's ‘Chemical Physiology,’ p. 40 (287—292).

In what precedes I have spoken of the phosph*ide* element as if there were only one substance which contains phosphorus in an oxydizable condition to be met with in the animal system; but I must remind the reader that, as we have already seen, this subject is, as yet, far from being well understood; chemists have differed and varied much as to the number of these proximate principles, but it is admitted that in all of them the phosphorus exists in a molecular or oxydizable condition: Fremy's cerebin, phospho-glyceric acid, oleo-phosphoric acid (270), Vauquelin's red phosphorized fat (268), Gobley's lecythine (272), and Fremy's ichthine and ichthuline (281), not to speak of the oxydizable phosphorus found in the urine by Ronalds (285).

Phosphatic element secondary.

332. Such being the distribution of the phosph*ide* what is that of the phosph*atic* element? This latter, which includes the different alkaline and earthy phosphates, is much more abundant than the *phosphide* element, and much more generally distributed throughout the system. It is found as an integral part of all the organs and all the tissues, but above all, it is met with in organs of secondary importance, or of low vitality, as also in the excrementitial matters, such as the bones, the teeth, the hair, the urine, and the fæces. Chemical analysis shows that the phosphates play but a secondary part in the system, so much so that their place may even be filled by carbonates (335). As we have seen, Liebig found that the herbivora excrete all the phosphoric acid contained in their fodder (266); Kletzinski and Hégar demonstrated that the phosphate of lime, given according to the ideas of Beneke, Mouriès, and Kœnig (261—263), was only utilized by the system when there was a deficiency of it in the food, so that the phosphates seem to act chiefly by their base and not by their acid (266A).

An essential difference be-

332A. There appears, therefore, to be an essential difference between the function in the system of the phos-

tween the phosphide and phosphatic compounds.

phide and that of the phosphatic principles. In fact, these functions seem to be as distinct and as dissimilar as the chemical characters and properties of the two primary elements which characterize the two series of compounds (98, 99). The first, the *phosphide* element, is localized in the most important tissues—those which specially relate to animal life; the second, the *phosphatic* element, is met with equally in the important parts, and in those which are only of secondary value. The *phosphatic* element always ends by being eliminated as excrementitial matter. The *phosphide* element is hardly ever or never excreted from the system without having undergone previous oxydization, and becoming transformed into the *phosphatic*, unless, perhaps, in some rare cases of disease, when, according to Ronalds, the colouring matter of the urine contains oxydizable phosphorus.—'On the Extractive Matter of Urine and the Excretion of Sulphur and Phosphorus by the Kidneys in an Unoxydized State,' 'Philosophical Transactions,' 1846, part iv. p. 461.

Difference of origin of these two elements.

333. If the origin of these two elements is examined, the difference is equally great. The *phosphatic* element is almost always contained in excess in the food, while it is nearly certain that the *phosphide* element is not found in the food, at least of one class of animals, the herbivora, as it does not exist in vegetables. It must, therefore, have its origin in the animal system, so that the phosphide element is specially characteristic of animals, and is not met with in vegetables.

333 A. Norton ('Pharm. Contr.' 1847, p. 466; 1848, p. 240) and Völcker ('Rep. Brit. Assoc.' 1857, p. 60; 'Jahr. Chem.' lxxv. 320) have, however, found that legumin contains phosphorus in an oxydizable state. Legumin is extracted from seeds, such as peas, almonds, oats, &c., and the phosphorus it contains is found to be associated with nitrogen, a body which, with this exception, is otherwise almost exclusively confined to animal tissues.

This association of phosphorus and nitrogen in the seeds of plants is a very remarkable fact, as it seems to indicate the point where life begins by an initiatory movement common to all living beings, both animal and vegetable.

Different action upon vegetables. Ville.

333 B. In 1859 Ville, Professor of Agriculture at the Museum of Natural History at Paris, carried out a series of important experiments which confirm this distinction between the two phosphorus elements. He found that preparations of the *phosphide* element, the hypophosphites for instance, not only could not be substituted for the phosphates or the *phosphatic* element, in the cultivation of vegetables, but that they had a deleterious effect upon plants, and ended by killing them ('Comptes Rendus de l'Académie des Sciences,' t. xlvi. p. 1044). My experiments upon young animals (126) have shown, on the other hand, that their growth is specially stimulated by the use of the hypophosphites, *i.e.* the *phosphide* element.

Physiological differences between the phosphide and the phosphatic compounds.

334. From the whole of these facts it is allowable to infer that the *phosphatic* and the *phosphide* elements have different if not altogether dissimilar functions in the system.

335. The phosphatic element (alkaline and earthy phosphates) fills in the animal system the same office as it does in vegetables. Its action is chiefly mechanical and chemical, similar, and sometimes perhaps altogether identical, with that of other neutral salts, such as the carbonates, the sulphates, and the chlorides. The strongest support is given to this view by the remarkable fact established by Liebig, that in the blood of herbivora a large proportion of the phosphates is replaced by carbonates with the same chemical and physiological result.—Liebig, 'Lettres sur la Chimie,' Paris, 1846, p. 161.

Phosphates like carbonates. Liebig.

Lehmann.

336. The phosphide element, on the contrary, is peculiar to animals, and plays in the animal organism the most important part of all, being the initiatory condition of oxydation and of all the molecular changes which follow therefrom. That this is not a mere conjecture

results from the researches of Lehmann ('Handbuch der Physiologischen Chemie,' Leipzic, 1859, S. 195), who found that in all new tissues, whenever there was a formation of new cells or fibres, there is an *increase* of the phosphates, that is, of the phosphatic element; and *that* not only in animals of the upper part of the series, but in animals of inferior orders whose system is poor in phosphates, and in which these salts are under other circumstances replaced by carbonates. If we reflect that the *phosphide* element, is a constituent part of the albuminoid or proteic substances, from which the tissues take their rise, we must infer that this excess of phosphates in new tissues is due to the oxydation of the *phosphide* elements contained in the proteic substances. For, as Lehmann says, 'There can be no doubt that all the tissues of the system are derived from the proteic substances, and it is more than probable that this transformation of the proteic substances is brought about by the oxygen conveyed by the blood from the lungs.'—(Lehmann, p. 342.) Such is also, as we have seen, the opinion of Carpenter, Draper, and Clarus (280—290).

Mulder. 336 A. That the oxydation of the proteic substances does produce an increase of the phosphates was proved experimentally by Mulder, who showed that fibrin when dissolved in hydrochloric acid gives a less deposit of phosphoric acid by treating with iron than it does when it has been oxydized by using nitric acid as the solvent.—Schmidt's 'Jahrbücher,' Bd. 65, S. 149.

Inferences. 337. The inferences to be drawn from the preceding facts, are the following:—

1. In the animal system the *phosphates* are constituent parts of completely developed, and consequently stationary, or already retrograde, histological elements.

2. The *phosphates* are the residue of the molecular metamorphoses, and are, so to speak, the ashes of intra-organic combustion.

3. The *phosphates* have no affinity for oxygen. They take no direct part in intra-organic combustion, which is the primary condition of vitality. They have but an indirect action, or no action at all on the calorification of the system, and upon the oxydation of the other substances with which they are connected.

4. The *phosphide* element, on the contrary, is an indispensable constituent of every protoplasmic or germinal substance; an essential condition of all progressive metamorphosis, perhaps of all action, of all dynamism, of all vital spontaneity.

5. Owing to its great affinity for oxygen, the presence of the *phosphide* element indicates that the substances in which it is contained, are those to which the action of the oxygen of the atmosphere is first and specially directed.

6. The localization of the proximate principles containing a *phosphide* element in the most important, and the most mutable histological tissues, such as the nervous substance, and the blood globules, shows that it must take an active initiatory part in vital action.

7. The power of calorification of the *phosphide* element, being superior to that of any other, indicates that by its oxydation, it must facilitate the combustion of the other substances of the system, with which it may be in contact or combination, as will be seen further on.

Phospholigy *equal* tuberculosis.

338. After the discovery of oxygen by Priestley, the first explanation of the function of respiration and hæmatosis given by Lavoisier was, that the blood, when placed in contact with atmospheric oxygen in the lungs, burnt a certain quantity of its carbon and its hydrogen, which were then exhaled in the form of water and carbonic acid gas. Modern chemical and physiological research has shown that the process is not so simple as Lavoisier had supposed. That part of the function of hæmatosis, which takes place in the lungs, instead of being a rapid

and almost instantaneous combustion, as was at first supposed, seems to be limited rather to an exchange between the gaseous principles of the blood, and those of the atmosphere. A part only of the elements are oxydized, while the rest complete the process in the capillary system, or in the tissues. Lavoisier and his school had supposed that this transformation of the organic substance into oxydized and excretory matters was direct and immediate. Modern research has shown that it only takes place by degrees, so that each primordial element, or each proximate principle goes through a series of metamorphoses fitting it successively for the series of intermediate offices, which it fulfils from the time of its building up in the system to that when after having been fully oxydized, or transformed into excrementitious substance, it is expelled from the body.

As yet we can only dimly perceive some of these metamorphoses, and it is but in rare instances that physiological chemistry is able to show a few of the intermediate forms presented by a proximate principle between its entry into and its exit from the system. In the present state of science it is very difficult to show what is the real function of most of the proximate principles, still more difficult to establish the connection, which must exist between the anomalies of these proximate principles, and the different forms of disturbance which they must produce. However, there can be no doubt that this is the future field for medical discovery (494), and the foundation upon which the medicine of the future will be based. This also is the kind of connection, which will now be shown to exist between the deficiency of the *phosphide* element, and the whole series of anatomical, physiological, and chemical facts established with regard to tuberculosis.

Combustibility of phosphide element.

339. The existence of a *phosphide* element, whether produced by integration or by assimilation, once admitted,

we are bound to infer that an element characterized by the presence of a body so prone to combine with oxygen, as oxydizable phosphorus must be among the most combustible, and the most oxydizable in the system. But, moreover, the proximate principles, which contain the *phosphide* element, besides being themselves highly combustible, must communicate to the other principles with which they are combined a degree of combustibility, which these latter would otherwise not possess. It is an established fact in chemistry, which meets with numerous applications in every day life, that the presence of a combustible body communicates to others which are less so the power of igniting at the ordinary temperature which they otherwise would not do. Lighting a common coal fire with wood and paper is founded upon this principle, and the ordinary lucifer match, which is composed of wood, sulphur, and phosphorus, is, so to speak, a prototype of the insensible combustion of living beings. The wood of the match would not burn without the sulphur; the sulphur would not ignite without the phosphorus. An infinitesimally small proportion of this latter, which takes fire by friction at the ordinary temperature, is sufficient to light the sulphur, which in its turn, sets fire to the wood. Although this fact has long been known in inorganic chemistry, it has only since Liebig has shown what was the function of the iron contained in the blood globules, that chemists have begun to perceive the importance of this mode of oxydation in organic substances. It has, however, already received some practical applications in agriculture.—Kuhlmann, 'Sur les Propriétés comburantes du Sesquioxide de Fer,' in the 'Répertoire de Chimie,' Paris, 1859, t. i. p. 398; Hervé Mangon 'Sur certains Composés organiques à Base de Fer comme moyen de Transport de l'Oxygène sur les Matières combustibles,' in the same Journal, p. 401.

Communicated by it to other compounds.

Liebig.

Now the phosphide element, as we have already

Phosphide

element a comburant.

seen, existing in the globules of the blood, and in the bioplasmic or albuminoid substances, which are the first to be acted on by oxygen, must play an important part in all the phenomena of oxydation and molecular metamorphosis produced by respiration and hæmatosis. We shall see farther on that this view is confirmed by chemical analysis, and that there is a direct connection between the excretion of the phosphates, and that of carbonic acid; that is to say, between the special oxydation of the *phosphide* element (336), and the general molecular oxydation of the system itself (376, 377). That the influence of the *phosphide* element upon the calorification of the body, to which frequent reference has been made, is a fact, is proved by the experiments of Demarquay, Duméril, and Lecointe, who found that phosphorus is of all substances the one which produces the greatest increase of temperature in the system. Small doses of phosphorus, say these experimenters, introduced into the stomach with the precautions requisite in order *to preserve the mucous membrane from its immediate and locally destructive action*, produce an increase of from 1·07 to 2·2 centigrade degrees. In some experiments the rise of temperature attained five degrees centigrade, or nine degrees Fahrenheit.—'Des Modifications de la Température animale sous l'Influence des Médicaments,' Paris, 1853, p. 21.

Before proceeding with the argument, the reader's attention must be called to these expressions, in reference to what has been previously stated (111, 112), as to the dangers attending the medicinal use of free phosphorus (474).

Proofs of Phospholigy from pathological physiology. Decreased phosphide, *equal* decreased oxydation.

340. The presence of the phosphide element in the system being closely connected with the oxydation of other substances (330, 336, 337), we must infer that if that element decreases, general molecular oxydation of the body will diminish also. Now, if tuberculosis depends on a decrease in the system of a combustible and calorific

element, such as oxydizable phosphorus, it follows that in this disease there must be a decrease of general oxydation, and a lowering of animal temperature. That this is really the case, is shown by the following facts.

Carbonic acid diminished in tuberculosis.

341. In consumption there is a diminution of the carbonic acid expired by the lungs as has been shown by Nysten ('Recherches de Physiologie et de Chimie pathologiques,' Paris, 1811, pp. 190 *et seq.*); Hannover ('De quantitate relativa et absoluta acidi carbonici ab homine sano et ægroto exhalati,' Copenhagen, 1845, p. 42); and Hervier and Saint Leger ('Recherches sur l'Acide carbonique exhalé par le Poumon dans l'État de Santé et de Maladie;' 'Comptes Rendus,' 1849, t. xxviii. p. 260, and 'Annuaire de Chimie,' by Millon and Reiset, 1849, p. 598).

Colour of blood.

342. The same fact is proved by the aspect of the blood. It has long been a matter of observation by physicians, that the venous blood of consumptives is redder than in the natural condition. This has been animadverted on at different times by many observers, such as Sydenham, Boerhave, Beddoes, Burdach, Parr, etc. (Ancell on 'Tuberculosis,' London, 1849, p. 5). Now we know that the black colour of venous blood depends upon the presence of carbonic acid, for, as Longet states, there can be no doubt that the difference in colour in the two kinds of blood in the veins and in the arteries, is owing to the different proportions of oxygen and carbonic acid contained in the blood.—Longet 'Traité de Physiologie,' Paris, 1859, t. i. 2e partie pp. 496, 497.

Claude Bernard's experiments on the glands and muscles have shown that the blackness of venous blood is owing to its having been already employed in molecular metamorphosis; that the blackness is in proportion to the intensity of this molecular action, and that it increases or decreases with this intensity (Claude Bernard, 'Leçons sur les Liquides de l'Organisme,' Paris, 1859, t. i. pp. 295 *et seq.*). We have just seen that redness is characteristic of the venous blood of consumptives, and on the contrary, as already stated (121), the use of the hypophosphites darkens the colour of the venous blood, not only up to, but beyond its natural tint.

Urine.

343. The fact of diminished oxydation is also shown by the deposit in the urine of consumptive patients containing an excess of uric acid, with a corresponding decrease of urea, as shown by Becquerel ('Séméïotique des Urines') and Ancell (the 'Lancet,' 1843, vol. ii. p. 83). It has been already mentioned (125), that these urinary sediments generally diminish or disappear under the use of the hypophosphites. That this is due to an increase of oxydation will be apparent if we consider that the formula of uric acid is $C^5H^4N^2O^2,HO$; while that of urea is $C^2H^4N^2,O^2$, so that, as Lehmann has shown ('Jahrbuch der Physiologischen Chemie,' Bd. i. S. 190), urea may be looked upon as formed by the partial or incomplete oxydation of two atoms of uric acid, with formation of oxalic acid and allantoine. This has been shown to be really the fact by Wöhler and Frerichs ('Annalen der Chemie und Pharmacie,' Bd. xlv. S. 340), who have, by direct experiments upon dogs and rabbits, found that uric acid is decomposed in the system in the same way as when oxydized directly by peroxide of lead, and that after its administration the urine of these animals shows an increase of urea and of oxalate of lime.

Temperature.

344. The lowering of the heat of the body in tubercular patients has been noticed by a number of observers, and has been specially studied by Bouchardat ('De l'Étiologie de la Tuberculose'); by Ancell ('On Tuberculosis,' London, 1852, pp. 42, 103); by Wunderlich ('Handbuch der Pathologie und Therapie,' Stuttgard, 1856, Bd. i. S. 293; und Bd. iv. S. 695). Sidney Ringer ('On Temperature in Phthisis,' London, 1865) has found that when there is an elevation of temperature in phthisis

it was only while the deposit is taking place, and has shown that it then constitutes a valuable diagnostic sign. Finlayson found that in tubercular children the temperature was higher in the evening, after the excitement and fatigue of the day; but in the morning rather below the average.—'Glasgow Medical Journal,' November, 1869.

This decrease of heat accounts for the great sensitiveness of the patients to cold and atmospheric variations. It has been just seen above (330) that, on the other hand, phosphorus increases the animal temperature.

344 A. So far, then, all the facts of pathological physiology known with regard to tuberculosis concur in showing that the special character of this diathesis is a decrease of molecular or intra-organic combustion, from which may be inferred all the abnormal phenomena depending on diminished oxydation as evinced in the functions of respiration, sanguification, urinary excretion, and calorification, just enumerated. This is in complete accordance with the theory of phospholigy; namely, that in tuberculosis the bioplasmic or proteic principles are incompletely oxydized, because they are deficient in their normal amount of the phosphide element, and are thus less combustible than in the healthy state.

Proofs of Phospholigy from pathological anatomy of tuberculosis.

345. Let us proceed to examine whether the hypothesis agrees as well with the anatomical as with the physiological facts of tuberculosis. If the bioplasmic or proteic substances are incompletely oxydized and insufficiently so, either to attain a higher degree of organization or to be excreted, they will be deposited in the tissues, and, so to speak, precipitated, like the decomposed elements of a saline solution, in the form of amorphous or incompletely organized material. The more important share any organ takes in the process of oxydation, the more liable will it be to this deposit of tubercular matter. If, as is now generally admitted, that part of the respiratory process which takes place in the lungs consists

in the oxydation, not as Lavoisier supposed, of all the combustible substances in the blood, but of at least a portion of them, it is evident that this chemical change will first be undergone by the most combustible among them, that is, by those which have the greatest affinity for oxygen. The proximate principles containing the phosphide element being the most oxydizable (339), must thus be the first to undergo the process of oxydation in the lungs, and if, owing to their deficiency in their characteristic element, phosphorus, this oxydation is insufficient, it is evident that the deposit resulting from this incomplete process ought to appear first of all in the lung.

Lungs. 346. Now, as is well known, the fact that in cases of tuberculosis the lung is affected in the vast majority of instances, is one of the discoveries due to the researches of Louis. From a summary made by Ancell (Ancell, p. 359), based upon the researches of Louis, Lombard, Boyd, Rilliet and Barthez, and Papavoine, it appears that of 1,136 cases of tuberculosis there was a deposit in the lungs 1,030 times. But there is more yet. Wherever the contact of oxygen with the combustible substances of the blood is more frequent and more immediate; in a word, wherever the function of oxydation is more active, that will be the chief place for the deposit of tubercular matter. In ordinary respiration it is the upper portion of the lung—the apex or top—which comes most into play; the lower portion only does so during forced inspiration. The tubercular deposit ought therefore to be more abundant at the top of the lung than in the rest. This is exactly what Louis has shown to be the case. 'Nearly always,' says he ('Recherches sur la Phthisie,' Paris, 1843, pp. 2, 7), 'the tubercles are more numerous, larger, and more advanced in their development at the apex of the lungs than at the base, so that in 123 cases of phthisis, I have met with only two exceptions to this rule.' The truth of this explanation is still further apparent from the fact that in animals it is no longer the apex, but the dorsal edge, which is the most active portion, and Heusinger ('Pathologie comparée') found that in birds, for instance, this is the preferential seat of the tubercular deposit.

Lymphatic glands.

347. Besides the oxydation which takes place in the lungs and in the tissues, there is a secondary system of circulation, whose office it is to take up the elements which have not completely fulfilled their biological evolution, to subject them to a new elaboration, and to return them into the general circulation, so that they may co-operate a second time in the general nutrition of the organism. This is the lymphatic system, the essential components of which are two kinds of organs, vessels and glands, the former serving to convey the substances absorbed, the latter to subject them to a new elaboration before they are returned into the circulation. The object of this is probably to complete the oxydation of material, which has not already fully undergone that process, either in the lungs or in the capillaries. Each lymphatic gland may therefore be looked upon as a small supplementary kind of lung, intended to complete the oxydation of the less oxydizable substances of the system, which require to be placed in contact with the vital gas a second time in order to finish their organic evolution. The proof of this is, that the glands consist of a cortical substance composed of a fine network of afferent vessels, and arterial capillaries, where the absorbed matters come in contact with oxygenated blood, after which they enter the central substance of the gland, and are conveyed towards the general circulatory system. As Kölliker ('Histologie humaine,' pp. 635 et suiv., Paris, 1856) has shown, the object of this arrangement must be the oxydation of the bioplasm contained in the gland.

Now, as we have seen above (340), this will only take place provided the substances to be oxydized have a certain degree of affinity for oxygen. If we admit the existence of a phosphide principle, not only oxydizable itself, but capable of communicating its combustibility to other substances (339), it is easy to understand how the deficiency of this principle will produce here as in the lungs incomplete oxydation (340, 345, 346), that is an arrest of development, the formation of incompletely elaborated material—in a word, tubercular matter (315). This is specially the case with the glands of the mesentery and of the intestine.

Composition of tubercle.

348. The different appearances presented by tubercular matter have, at different times, greatly exercised the sagacity of pathologists, and more particularly of late years of microscopists. Opinions have been continually shifting during the last few years: a number of classifications have been proposed, and opposite views have been upheld, founded upon these physical appearances.

Microscopic appearances.

Supposed varieties of tubercle. Empis. Clarke. Niemeyer.

349. More particularly within the last few years an essential distinction has been drawn by Empis, Andrew Clarke, and others, between caseous or scrofulous tubercle and the grey granulation or cellular tubercle. Niemeyer and others have also endeavoured to show that there was a pathological and clinical difference between caseous deposits in the lungs, which they have called catarrhal or bronchial phthisis, and the infiltration of granular tubercle. All these distinctions, which are entirely founded upon *post mortem* appearances, are only a revival of old and unsuccessful attempts of the same kind made some years ago. Dr. Andrew Clarke proposes to distinguish *nine* kinds of phthisis. Perroud, thirteen years ago ('De la Tuberculose,' Paris, 1861, p. 47) proposed to distinguish *twelve* different kinds of tubercles. There is no necessity for any distinction of this kind. All these different forms of tubercle may be found coexisting or running into one another; the symptoms and pathological appearances

Perroud.

also gradually shade off from the most torpid form of phthisis to the most acute by any number of intermediate degrees; above all, and this is a double-edged argument, both in favour of the specific action of the hypophosphites and of the unity of the tubercular diathesis, all these forms are equally amenable to the action of the specific remedy. Nevertheless it is evident that the more acute the disease the earlier must the treatment be used, and the more easily may the practitioner mistake already accomplished tubercular infiltration of the lung for simple congestion or inflammation. So that, in cases of this kind, in estimating the accuracy of the preceding proposition, it is necessary in cases of acute phthisis to guard even more carefully than usual against these two sources of error (66, 161, 162). Ten years ago ('De la Cause immédiate de la Phthisie,' etc., Paris, 1864, p. 1164) I stated that these distinctions between the different forms of tubercular matter were of no practical use, and were mere pathological dilettanteism. I am of the same opinion still.

Virchow. Sanderson.

349 A. Another and altogether opposite view has been taken by other pathologists, such as Virchow and Burdon Sanderson, according to whom tubercular matter has no distinctive characteristic at all, and cannot, for instance, be distinguished from the products of ordinary inflammation. This also is only a revival of the old physiological doctrine of Broussais, that all disease consisted in inflammation, and that tuberculosis was nothing but chronic plegmasia of the white vessels of the lungs. This view is as unfounded as the preceding one.

Inoculability of tubercle. Villemin.

349 B. The remarkable discovery made by Villemin that tubercle is inoculable, supplemented by the additional fact since established, that the inoculation of any decaying morphotic material may give rise to tubercle, points to the same conclusion: that the tubercular diathesis is one and the same, though the tubercular matter itself may

vary in physical appearance. I am glad to find that my views on this subject are shared by so sound a pathologist as Walshe ('On the Lungs,' p. 413), who says: 'It will be probably conceded by impartial lookers-on that the attempt to fix the microscopical nature of tubercle has reached but an early stage of advancement. How short a time has passed since the *specific tubercle-cell* figured as the cherished cardinal fact in the micrology of the disease; while now the doctrine of the hour not only stigmatizes the distinctive cell as a pure myth, but invites us to accept articles of faith utterly antagonistic to all specificness. Thus, according to Virchow, "the cells present in tubercle may be relics of epithelial cells, *or* of some other natural product; *or* they may be related to, or identical with, exudation-cells; *or* pus-globules; *or* to and with the cells occurring in cancerous growths; *or* in typhoid infiltrations." (Ranking's "Retrospect," vol. xviii.) And from the observations of Dr. Burdon Sanderson it would follow: "there are no elements in the induration of phthisis which are not to be found in chronic bronchitis;" nay, more, "it is even possible there are no anatomical elements in the induration of phthisis, which are not to be found in the healthy lung." Now, practically, to what issue do the latter propositions point? Presumedly, not to the equations "tubercle = lung-substance," and "bronchitis=phthisis;" not a whit more to the paradox, "hypertrophy of the lung and tubercle mean one and the same thing." But, inasmuch as they teach microscopical identity, "actual" or "possible" between objects so utterly dissimilar to unaided sense, there seems to be no escape from one or other term of the following dilemma: Either this corpuscular identity is the dominant and essential pathological fact, and men must be wrong in considering phthisis and bronchitis different diseases; or the seeming identity that captivates the micrologist of to-day is a quality of *mere secondary and quasi-acci-*

dental importance; and the arrangements, the site and mode of accumulation, the chemical conditions, vital tendencies, &c., of these elements really give them their specific characters and their distinctive potentiality. Their dynamism, more than their statics, would hold the place of real significance.'

These divergences explained.

350. The theory of phospholigy gives an easy and physical, consequently practical, explanation of what Walshe refers, somewhat vaguely and unsatisfactorily, to the arrangements, the site and mode of accumulation, the chemical conditions, vital tendencies, etc., of these elements.

If the phospholigic diathesis be the cause of the production of tubercle, we shall infer that tubercular matter must vary, to a certain extent, in its composition and appearances, because both of these will vary, according to two conditions—the degree of phospholigy and the nature of the materials from which it has been derived by a process of insufficient oxydation. This alone affords a satisfactory explanation of the varied forms presented by tubercular and by scrofulous deposits.

Scrofula.

351. This leads to the inquiry, what is the real connection between scrofula and pulmonary tuberculosis?—a question which has much worried pathologists and physicians in all ages. The phospholigic theory again affords a satisfactory solution. We have seen (345—347) that the organic materials must pass through a succession of metamorphoses characterized by a gradual series of successive oxydations in the lungs, in the capillaries, and in the lymphatics. If this be the case, these successive oxydations must apply in turn to materials of decreasing combustibility. If the phospholigy be very intense, the materials offered to hæmatosis in the lungs will be so refractory to oxydation that some of them will not be able to undergo even the initiatory stage of the process, and these will be at once deposited in the lungs in the form of tubercular matter.

If the phospholigy be less strongly marked, there will be sufficient oxydizable principles to provide for pulmonary combustion and a first degree of oxydation. But their affinity for oxygen will then be exhausted, and as they will be unable to undergo the subsequent oxydations required in the capillaries and in the lymphatic system, these are the points where oxydation will remain incomplete, and where the secondary deposit of tubercular matter will take place. Scrofula is, thus, an incomplete and less intense form of tuberculosis than pulmonary phthisis, affecting different histological elements. This enables us to explain why scrofula has been looked upon as a kind of safeguard against phthisis; why it is more under the influence of secondary or accidental causes, why it shows itself in local degenerescence of the cutaneous and locomotive systems, that is to say, of the seat of functions less essential to life than respiration and secondary to it; why it does not so indispensably require the use of the specific treatment, but may yield to local means, or to remedies which only act upon secondary conditions; why it may even be cured spontaneously or by simple hygienic means more frequently than phthisis; why it is more often met with during the period of growth, that is, when the production of the locomotor tissues is most active.

352. We have seen (347) that the lymphatic system, which may be looked upon as the type of closed or vascular glands, has the function of oxydizing the materials it absorbs by bringing them into contact with arterial blood. Wherever a similar anatomical disposition is met with, we may infer there is an analogous function; and when there is phospholigy, we may expect to meet with similar deposits of tubercle, and such is the case.

Tuberculization of the intestines.

Next to the lymphatic system Peyer's glands in the intestine constitute the most considerable and most important system of vascular glands. If our reasoning be correct, we should infer that they must be the seat of tubercular deposit. Louis and Rokitansky (Ancell on 'Tuberculosis,' p. 181) have shown that, next to the lung, these are the organs which are the most frequent seat of tubercular deposit.

Chemical proofs of phospholigy.

353. Tubercular matter is, as we have said, bioplasmic albuminoid substance, imperfectly developed on account of its having undergone incomplete oxydation, not, as was supposed by Beddoes and MacCormack (222), because there is a deficiency of oxygen, but because the materials themselves have lost their affinity for that gas, in consequence of a decrease in their phosphide element. If this theory be correct, it ought to be confirmed by the elementary chemical analyses of tubercular matter. As already shown (319, 320), the chemical analysis of tubercular matter, as well as of the blood, in phthisis, is incompetent to decide whether there really be or not a decrease in the phosphide element. But what it does show is, that tubercular matter is a bioplasmic or proteic substance, from which a certain but variable number of atoms of carbon, hydrogen, and oxygen have been subtracted (Scherer's 'Untersuchungen zur Pathologie', in 'Canstatt's Jahresbericht,' 1843, Bd. ii. S. 143). If we take as the composition of protein the formula adopted by Liebig, $C^{48}H^{36}N^{6}O^{14}$, we shall find that the results given by Scherer's analyses of tubercule in different organs prove that these really are a residue of oxydized proteic or albuminoid materials, and singularly confirm the explanations given above, by showing that the tubercular matter in the lungs contained a less quantity of carbon and hydrogen, that is, had undergone a greater amount of oxydation than the tubercular matter found in other organs. The formulæ found by Scherer for tubercle were—

Composition of tubercle.

Scherer.

In the lungs	$C^{43}H^{35}N^{6}O^{13}$
In the liver	$C^{45}H^{36}N^{6}O^{13}$
In the peritoneum	$C^{46}H^{36}N^{6}O^{13}$
In the brain	$C^{46}H^{37}N^{6}O^{13}$
In the mesentery	$C^{46}H^{38}N^{6}O^{12}$

We thus see why tubercles in the different organs present, as we have explained they must do, not only a difference in chemical composition, but also varying histological forms, although retaining, particularly to the naked eye, a common and uniform aspect (348, 349).

'Facies non omnibus una,
Nec diversa tamen, qualem decet esse sororum.'

Deficiency of phosphorus

353 A. The theory of phospholigy supposes that some of the proximate phosphorus principles in the system are deficient in the phosphide element which constitutes their essential characteristic. Although, as I have said, chemical analysis has hitherto been unable directly to decide this question, it is a singular fact that the only analyses yet made which bear upon the point coincide in confirming my theory. Frick, of Baltimore ('American Journal of the Medical Sciences,' January, 1848), found on analysing the blood in four cases of tuberculosis in the first stage that there was a notable diminution of its inorganic elements. In these analyses, as in all those which had hitherto been made, the phosph*ide* and the phosph*atic* element were confounded together, and calculated after oxydation as phosphates (320). He found that in 1,000 parts of tubercular blood the maximum of these phosphates was 0·351, the minimum was 0·197, the mean 0·291, while the mean in the normal condition was 0·874. It is true that at the same time he also found a diminution of the chlorides and of the iron. But this difference was much less marked than for the phosphorus-elements. His mean proportion of normal iron being 0·582, he found for his consumptive cases a maximum of 0·584, a minimum of 0·416, and a mean proportion of 0·494. For the chlorides, his normal mean being 4·882, he found for his consumptive cases a maximum of 5·632, a minimum of 2·530, and a mean proportion of 3·973. So that while the salts of phosphorus showed a diminution of more than two-thirds, the iron and the chlorides had

In the blood. Frick.

fallen off less than one-sixth. Besides which, the maximum of the chlorides in one case exceeded the normal mean proportion, in the case of the iron it was equal to it, while the maximum of the phosphorus-elements was less than one-half of the normal mean.

In tubercular matter. Boudet.

353 B. As far back as 1844, Boudet, in a paper read before the Academy of Medicine in Paris ('Lancet,' September, 1844), stated that in the chemical analysis of tubercular matter he had determined the presence of cerebric acid and of large proportions of cholesterine and casein. At first sight this appears a flat contradiction to the theory of phospholigy, because it is hardly possible to admit that tubercular matter is owing to the insufficient oxydation of the proteic principles, on account of their deficiency in oxydizable phosphorus if it contains cerebric acid, which is one of the proximate principles where the phosphide element is most largely found. That Boudet found in tubercular matter a substance having all the external appearances of cerebric acid may no doubt be admitted, but, as he did not analyse this substance, it is very possible that it was deficient in its essential principle the phosphide-element, and in that case its deposit at the same time as casein and cholesterine would be proof positive in support of my theory.

Deficiency of phos*phide* principles in the blood. Becquerel and Rodier.

353 C. This is not mere conjecture. In the same year Becquerel and Rodier in their researches on the composition of the blood ('Recherches sur la Composition du Sang dans l'État de Santé et l'État de Maladie,' Paris, 1844, p. 99), thought they had discovered, as a characteristic of tuberculosis, an increase in the quantity of *phosphorized fat* contained in the blood, and they had called particular attention to this fact (274—277). But two years later (Becquerel et Rodier, 'Chimie pathologique,' p. 64), on repeating these analyses with Cahours, they found that the substance which they had taken for phosphorized fat, although produced in the same conditions and with all the external characters of that substance, *contained no*

Cahours.

phosphorus at all, but consisted only of fatty matters combined with chloride of sodium. That this result was owing to some error in their mode of extracting the compound is unlikely, from the fact that Cahours found that the other elements which they had extracted from the blood, the seroline, the cholesterine, and the animal soap, were perfectly pure. The substance which had all the external appearances of phosphorized fat, and had been taken by them for such, was alone found on analysis defective in its normal composition, as it contained no phosphorus. There is no stretch of advocacy on my part in claiming these singular and hitherto neglected facts as equally singular proofs in favour of my theory.

These facts all point to theory of phosphoJigy.

354. We thus see that the different phenomena hitherto observed with regard to tuberculosis, whether anatomical, physiological, chemical, or even microscopical, may be explained by the hypothesis of a want of oxydizability in the bioplasm, or nutrimentary and histogenic material, consequent upon a modification in its chemical composition, exactly such as would be produced by the want or decrease of the phosphide or oxydizable phosphorus-element.

Objection answered.

355. But it may be objected, What reason is there to suppose that this want of oxydizability depends upon a deficiency of the *phosphide* element rather than upon any other chemical modification, which may have diminished the affinity for oxygen of the different albuminoid compounds? The reasons are the following:—

First, it is a fact that an oxydizable phosphorus-element exists in the albuminoid principles (330 A, 336, 336 A);

Second, this element must be the most oxydizable part of them (330 B);

Thirdly, a preparation of phosphorus, which is both assimilable and oxydizable (the hypophosphites), has a specific action against tuberculosis (235).

Further proofs. Phthisis in animals. Common herbivora, rare in carnivora.

356. Lastly, facts pointed out by Rayer ('Fragments d'une Étude sur la Phthisie dans les différentes Classes de la Série animale,' 'Archives de Médecine comparée,' pp. 191, 192) in his researches on the relative frequency of phthisis in the different classes of animals come in very singularly to confirm this view. Rayer found that in the herbivora phthisis is much more common than among flesh-eating animals. Now these latter find the *phosphide* element already formed in their food; the former do not, because the phosp*hide* element does not exist in vegetables (333), so that as their blood contains a smaller quantity of phosphorus-compounds (335), they must be much more liable to experience the want of them. This is not only true for mammiferous animals, but equally holds good in birds. Rayer has likewise shown (p. 197) that in birds of prey, which live upon flesh, tubercles are hardly ever met with, either in the lungs or elsewhere, while they are common in other classes of birds (366).

Blood-drinking.

357. These observations furnish the explanation of a practice adopted in some instances by consumptives, to which Dr. Williams thus alludes: 'Another practice, carried on in the South of France, and which we cannot regard as otherwise than disgusting, is to drink lambs' blood; and when at Hyères we ourselves witnessed, with a shudder, elegantly dressed French ladies repair daily to the slaughter-house, and quaff the reeking draught, but with what result we never learnt.' (On 'Pulmonary Consumption,' London, 1871, p. 377.)

Further proofs of identity between phospholigy and tuberculosis.

358. Besides these there are other facts which all point in the same direction, so that the theory of phospholigy gives us the key to several clinical phenomena which had hitherto remained unexplained.

Waste of phosphorus in the urine.

A portion at least of the phosphates excreted from the system must proceed from the combustion of the oxydizable phosphorus or *phosphide* elements (288—292); so that, when there is no change of diet, we may conclude that there will be a relative proportion between the amount of excreted phosphates and the waste of oxydizable phosphorus. If such be the case, we may expect to see phthisis developed whenever there is a permanent increase in the amount of phosphates excreted. Clinical observation shows that such is really the case, and the coincidence between tuberculosis and an increase of the phosphatic urinary excretion has been fully established. As we have already seen, even so far back as 1783, Baume, and since then Larcher and Dupois in 1825, had remarked the increase of phosphates in the urine of consumptives, whence Larcher had endeavoured to find the cause of the diathesis in the waste of the phosphate of lime, the same idea as was afterwards again taken up by Beneke and Kœnig (313 U, V, W). Rayer ('Maladies des Reins,' t. i. p. 64) has also shown that in certain cases of chronic nephritis the phosphatic diathesis is followed by tuberculosis.

Brain waste.

359. We have seen (255, 268—273) that the proximate principles containing the phosphide element are chiefly met with in the nervous substance, and it has been established by the researches of a number of experimenters that there is a direct connection between the amount of phosphates excreted in the urine and cerebral or nervous wear and tear. Bence Jones was the first ('On Animal Chemistry,' London, 1850, p. 87) to show that there was increased phosphatic excretion in all acute diseases of the nervous system, which fact has since been confirmed by Sutherland ('Medico-Chirurgical Transactions,' vol. xxxviii.), Tomowitz ('Zeitschrift der Wien Aerzte,' October and November, 1851), and Hammond (American 'Journal of the Medical Sciences,' April, 1856). Mosler ('Studien zur Urologie,' 'Archiv. des Vereins für Wissenschaftliche Heilkunde,' Bd. i. S. 571) has shown that this increased excretion of phosphates may be a direct consequence of cerebral activity, independently of variations in the food or muscular action.

Bence Jones.

Sutherland.

Tomowitz.

Hammond.

Mosler.

If, therefore, we look upon this excretion as proportionate to the wear and tear of the phosphide element, we may expect to find that wherever this is very strongly marked, there also we shall meet with an increased tendency to tuberculosis. Such is the case. As will be seen further on (379), the phosphatic excretion is greatly increased during attacks of insanity, and a large proportion of the insane do, in fact, fall victims to phthisis.

Alcohol.

Bence Jones. Böcker.

Ogsten.

360. On the other hand, the use of certain substances, particularly alcoholic stimulants, diminishes the phosphatic excretion, as shown by the researches of Bence Jones (*loc. cit.*) and Böcker ('Beiträge zur Heilkunde,' Bd. i. S. 240). According to Ogsten ('Pathological Observations on the Bodies of known Drunkards,' 'Medico-Chirurgical Review,' April and October, 1854), tubercles are hardly ever met with in the bodies of confirmed drunkards. Bouchardat and Sandras, in their researches on the transformation of alcohol in the system ('Annales de Chimie et de Physique,' t. xxi. p. 448), have shown that it acts by interfering with oxydation, and gives to the blood the dark or cyanotic character which, as we have seen (342), is the opposite colour to that observed in phthisis.

Bouchardat and Sandras.

Since I pointed out, eleven years ago, this connection between the effect of alcoholic stimulants, the decrease of phosphatic excretion and tuberculosis, a French practitioner has started the alcoholic treatment of phthisis. This is no novelty, and certainly no improvement either (210). The whiskey cure is an old established mode of treatment in America.

Saving of phosphorus under treatment. Brattler.

361. While the increase of phosphatic excretion has been found to prevail in phthisis (358), Brattler ('Ein Beitrag zur Urologie,' München, 1858, p. 61; Parkes 'On the Urine,' p. 137) has shown that there is, on the contrary, a decrease of the phosphoric acid found in the urine during an improvement in the condition of consumptives.

Concordance of proofs.

362. In the face of this array of proofs drawn from chemistry, anatomy, human and comparative pathology, and from things hitherto neglected or unknown, I have been able after, as may be seen, very considerable research, to meet with no one contradictory fact. So that in the present state of science everything concurs in pointing to the inference that tubercle is an incompletely developed bioplasm or albuminoid protein substance, consequent upon imperfect oxydation; that this imperfect oxydation itself depends upon a condition of phospholigy or a deficiency in the system of the *phosphide* or oxydizable phosphorus-element, that is to say, that it is owing to the deficiency or deterioration of the normal proximate principles containing oxydizable phosphorus, either through their excessive wear and tear, or through their not being produced in quantities sufficient to supply the expenditure of the system.

Williams.

These views of mine were published upwards of ten years ago. Since then, in 1871, Dr. Williams has elaborately endeavoured to establish the fact, that tubercle is an incompletely developed substance, an opinion which he had expressed as far back as 1836, and which has long been prevalent in medicine (314, 315). He has stopped short at this point, however, and merely gives the reader another rehearsal of the play with the part of Hamlet left out.

Connexion of phospholigy with other diseases.

363. Let us now see what confirmation or contradiction to these propositions is to be met with in studying the pathological and etiological relations of tuberculosis.

Pathologists have long since pointed out certain conditions of antagonism or relationship between phthisis and other diseases.

Tubercle and cancer.

364. Walshe ('The Nature and Treatment of Cancer,' London, 1846, p. 185), many years ago, showed that there was a marked antagonism between cancer and phthisis. In 104 *post mortem* examinations of cancerous patients collected by him tubercles were only met with in seven

cases. So that, as he has since stated ('On Diseases of the Lungs,' London, 1871, p. 518), 'although there is no absolute constitutional antagonism between the two complaints, they rarely co-exist.'

Here, however, I differ from him, for in the very rare cases where the two diseases have been found co-existing, it is a question whether that may not have been owing to their successive instead of their concomitant development. I have met with four instances where female patients who have been cured of phthisis by the hypophosphites have died many years afterwards of cancer of the womb.

The following very singular series of facts, which had passed altogether unnoticed until I brought them forward, throw a remarkable light upon this point, and go far to explain the antagonism between these two kinds of disease. It is unnecessary for me to state what may be the views I hold concerning cancer: suffice it to say that if tubercle depends upon the want of the *phosphide* element in the system, it will not be met with where an excess of this element exists. Now such seems to be the case in the cancerous diathesis, for it is a very remarkable fact that almost every chemist who has analysed cancerous matter has pointed out the existence in it, sometimes in considerable quantity, of a phosphorized substance.

Chemical composition of cancer.

365. As is well known, the external appearance of certain forms of cancer is so very like the cerebral substance that it has received the name of encephaloid. But as far back as 1822 Vingtrinier ('Journal de Pharmacie,' tom. viii. p. 415), a French chemist, in one of the earliest analyses made of cancerous matter, having precipitated the phosphorized material in the state of phosphate of lime, was struck, as he says, with the existence of the very large quantity of phosphate, the presence of which in this part of the body appeared to him very singular (331). Baudrimont (Lhéritier, 'Chimie pathologique,' Paris, 1842, p. 683) gives the following

Vingtrinier.

Baudrimont.

result as the analysis of encephaloid cancer taken from the liver:—

Water	0·6500
Fibrin	0·3325
Red and white fat, similar to that of the brain (268)	0·0120
Gelatine	0·0012
Osmazome	0·0008
Loss	0·0035

Foy.

Foy ('Archives de Médecine,' tom. xvii. p. 185) in two analyses of cancerous substance also met with considerable proportions of white and red fatty substances, which no doubt had the same characters as in Baudrimont's case. In Foy's analyses 100 parts of encephaloid cancer yielded as much as 7·50 of white and 5·35 of red fatty matter. In scirrous cancer 100 parts yielded 5 of white and 3·25 of red fat. According to Lhéritier (*opere citato*), Wiggers has also indicated the presence of phosphorized fat in encephaloid matter. In confirmation of Foy's analyses, he gives the two following, made by himself. 100 parts of scirrous uterus gave the following results:—

Lhéritier.
Wiggers.

Water	21·15
Albumen	29·85
Fibrin	15·20
Phosphorized fat	6·00
Oxyde of iron	1·25
A substance similar to cholesterine	7·00
Saline matters	9·55

An encysted melanotic cancerous mass taken from a horse gave the following for 100 parts:—

Water	20·70
Albumen	20·00
Fibrin	4·75
Black-colouring matter	40·20
Phosphorized fatty matter	5·35
Oxyde of iron	1·00
Salts	8·00

It had been objected to Foy's analyses that the fats he had extracted proceeded from the tissues, in which the morbid substance had been developed. Lhéritier observes rightly that this objection would not apply to his second analysis, as here the morbid matter was surrounded by a cyst.

Gorup-Besanez.

Gorup-Besanez ('Archiv für Physiologische Heilkunde,' 1849, pp. 738, 739), in a cancerous tumour of the parotid gland, found the following composition—for 189·57 parts of solid substance:—

Pyine, chloride combinations, alkaline sulphates, and watery extract	49·07
Phosphorized fat and alcholic extract	26·51
Albuminoid substance	106·33
Salts undecomposed by heat	7·66

The same chemist (Lebert: 'Traité des Maladies cancereuses,' Paris, 1851, pp. 42 *et suiv.*) gives the following as the result of analysis of a cancer of the cheek:—

Out of 18·9 solid parts,

Soluble albumen or pyine and extractive matters	4·9
Phosphorized fat and alcoholic extract	2·6
Albuminoid matter	10·6
Insoluble salts, not decomposed by heat	0·8

Cancer common in carnivora, rare in herbivora.

366. It is not a little singular in this order of facts that, while the theory of tuberculosis being equivalent to phospholigy explains the antagonism known to exist between tubercle and cancer, where, from what precedes, the phosphide element appears to be in excess, in the carnivora, which find the phosphide element in their food, and consequently may assimilate an excess of it (356), cancer, as shown by Rayer (*loco citato*), is very common, while tuberculosis is very rare. In herbivora, on the contrary, as Rayer has also shown, the opposite condition prevails—tuberculosis is common and cancer is not so. So that when the *phosphide* element is abundant in the food, tuberculosis is rare and cancer is common, when the phosphide element is lacking, tuberculosis is common and cancer becomes rare.

Activity of cancer explained.

367. In the same way, if we admit, as we have seen reason to do (331, 336, 337), that the presence of the *phosphide* element is one of the conditions, and one of the characteristics, of the integration into the system of new materials, consequently of the growth of tissues, its large proportion in cancerous growth may explain the constant

tendency of these tumours to increase. It may also indicate why cancer is more frequent after adult age, the period of life during which, as we have seen, according to Lhéritier (271), the phosphide element is most abundant. Hence, also, we may understand the usefulness of an exclusively vegetable diet in cancer. It is very evident that all these facts which have hitherto passed altogether unnoticed by pathologists, show a complete concordance with the theory of phospholigy and a coherence which has hitherto never been met with in the study of pathological phenomena, If they be mere coincidences they are very singular ones indeed.

Diabetes.

368. Diabetes is another complaint which shows very great connexity, not of antagonism, but of relationship, with phthisis. But here the nature of the connection is not so apparent as for cancer. The affinity between tuberculosis and diabetes has long been known. It was pointed out by Prout and by Rayer, and since then by other observers—Copland, Grisolle, Walshe, and Reynoso. In nineteen *post mortem* examinations of diabetic patients Bouchardat ('Etiologie de la Tuberculisation pulmonaire,' in the Supplement to 'l'Annuaire de Thérapeutique' for 1861, p. 4) found tubercles in every instance. The condition, which appears to be common to both these complaints, is incomplete oxydation; but the subject requires further study and research. The reader will find at p. 762, of my French work, 'De la Cause immédiate de la Phthisie,' etc., Paris, 1864, further details on this head.

Pathologists have also observed certain relations between tuberculosis and other morbid states, such as cyanosis, chloro-anæmia, etc. But these subjects will be considered after studying the etiological conditions of tuberculosis.

Phospholigy and causes of tuberculosis.

369. The study of etiology, or the causes of disease, is one of the least advanced parts of pathology, owing to the difficulty of the subject, the deficiency of proper materials, and above all, the want of that scientific precision

which is so often absent in medicine. As we have seen (229), every morbid entity leads us to infer the pre-existence of some specific morbid condition. In the case of phthisis, this preceding specific condition is not to be found in the variety of external influences which apparently induce phthisis, so that we are compelled to seek for it, as has been done by almost all pathologists in some particular state, some special predisposition of the system, in a word, in a constitutional diathesis (310—315). This diathesis has been called *tuberculosis*, while the series of phenomena which induce or attend the formation of tubercles has been called *tuberculization*. When the diathesis exists, its manifestations may be called forth by a great number of external conditions, the influence of which will be proportioned to the intensity of the diathesis. The greater this intensity, the more rapid and the more extensive tuberculization will be; while, on the other hand, the less intense the tuberculosis the less will be the power of external conditions to promote the formation of tubercle. The causes of tubercular diseases must therefore be distinguished into two classes, those which produce the constitutional state, that is tuberculosis, and those which excite or promote the deposit of tubercular matter, that is tuberculization. The different etiological conditions which have been found to precede phthisis and cognate diseases may be classed under one or other of these two heads, and an examination of each of them in turn will show how far they contradict or confirm the hypothesis of phospholigy being the proximate, that is the essential, cause of tuberculosis.

We are thus led to attempt the solution of the two following questions:

Are the causes of tuberculosis such as would give rise to phospholigy?

Can the action of the causes of tuberculization be explained by supposing the pre-existence of phospholigy?

369 A. It is here necessary to refer back to one or two

Connection between excretion of carbon and that of phosphorus.

points already mentioned, but which require some further development. The proximate principles containing a *phosphide* element have been shown to exist chiefly in the nervous substance, in the blood globules, in the albuminoid materials, in the muscles, and lastly in spermatic matter and in the egg (331). We have been led to infer from their chemical composition that these *phosphide* principles were the first to experience the combustive action of oxygen, and that by their great calorific power they must contribute to the oxydation of the other materials with which they are combined (330). We have also been led to admit that as oxydation is the primary condition, or at least a coincident one, of all vital phenomena, and that its final result is the formation of carbonic acid, the amount of intra-organic oxydation may be reckoned by the quantity of carbonic acid excreted in a given time. Whilst the amount of excreted carbonic acid is the measure of the amount of general oxydation (339—341), we have seen that the amount of excreted phosphoric acid is, to a certain extent, proportionate with the oxydation of the phosphide element (343). The study of the connection between these two phenomena throws considerable light on the question, which it is now attempted to elucidate. The enumeration just made of those parts of the organism where the *phosphide* element is chiefly located, shows that it must take a great share in the oxydation which accompanies all the functions of relation whether the act be intellectual or sensitive, one of locomotion, or one for the propagation of the species.

Analysis of vital activity.

370. If we examine what takes place during the activity of one of these functions, we shall see that they may present three distinct stages, each characterized by a distinct sensation, and consequently by an equally distinct condition of the nervous system. These are

The stage of satisfaction,
The stage of fatigue,
The stage of exhaustion or prostration.

371. During the first phase the feeling of want, of desire, or of appetite which had preceded or excited functional activity disappears, and is succeeded by one of quiet, comfort and satisfaction. In a normal and regular state of things this feeling of satisfaction induces the cessation of functional activity.

Period of satisfaction.

372. Under the influence of different causes, the functional activity, instead of ceasing on the appearance of the sensation of satisfaction, may be continued or repeated for a longer or shorter period, but in this case it is no longer carried on spontaneously and, so to say, instinctively, but only as an express manifestation of the will. It is not attended now by a feeling of satisfaction and comfort, but by one of fatigue, which goes on increasing in intensity and thus indicates the different degrees of nervous energy, which are successively brought into play to stimulate the system, and to compel the organs to continue their action.

Of fatigue.

373. After this a stage is reached where the will itself becomes powerless, nervous incitation stops, and the function ceases through exhaustion or prostration.

Of exhaustion.

These three phases of animal activity evidently correspond to three different conditions of the nervous system, and what we know of the chemistry of vital action is sufficient to justify us in inferring that each of these three different conditions of *satisfaction*, *fatigue* and *exhaustion*, is attended by a change in the molecular state of the nervous system.

Now, as we have seen (359) that nervous activity is attended by oxydation of the *phosphide* element, which is one of its necessary conditions and is proportionate to its intensity, we are justified in inferring that the decreasing energy of innervation during these three phases of action successively corresponds to a wear and tear, to a decrease, and lastly to a temporary exhaustion of the *available phosphide* element.

Each of these states coincident with different degrees of waste of phosphorus

374. This is not a mere speculative and theoretical conclusion, but is confirmed by chemical analysis. Suther-

Chemical proofs.

In brain work. Sutherland.

land ('Medico-Chirurgical Transactions,' vol. xxxviii.) found that in the insane the excretion of phosphates was considerably increased during paroxysms of excitement, while, on the contrary, it fell below par during the subsequent period of exhaustion.

Muscular work. Mosler, Hammond, Lehmann, Speck, and Beneke.

375. The analyses of Mosler ('Archiv des Vereins für Wissenschaftliche Heilkunde,' Bd. iii.), Hammond ('American Journal of the Medical Sciences,' 1855), Lehmann ('Archiv des Vereins für Wissenschaftliche Heilkunde,' Bd. iv. S. 484), and Speck (Ibid. p. 521), show that the excretion of urinary phosphates is increased during muscular exercise if moderate; while Beneke has shown that forced labour, instead of still further increasing this excretion, has the effect of diminishing it. ('Über die Wirkung des Nordseebades,' Göttingen, 1855, p. 83.)

375 A. The increase in the quantity of excreted phosphates depends, therefore, more particularly upon the waste of the nervous element, and not, as might be supposed, upon that of the muscular or general elements of the system, as fatigue and exhaustion diminish the excretion of phosphates, although muscular activity may still continue.

Böcker.

375 B. That there is a direct connection between the excretion of the phosphates and waste of nervous element is proved by the fact that this excretion falls to its lowest point during the cessation of nervous activity. Böcker (Parkes, *loc. cit.*, p. 89; Schmidt's 'Jahrbücher,' Bd. 109; and Canstatt's 'Jahresbericht,' 1860, Bd. i.) instituted a comparative analysis between the urine secreted during rest in bed while awake, and that which was secreted during sleep. He found that in the latter case the excretion of phosphoric acid was diminished one-third, while other elements, such as sulphuric acid, were slightly increased and the urea more than one-half. As in this instance the conditions were the same for the muscular but different for the nervous system, it is to these latter we must attribute the variation in the excretion of the

phosphates. Many physiologists, as is known—among others, my master, Buchez—admit that it is chiefly during sleep that repair of nervous waste takes place. During sleep there is, therefore, less waste of phosphorus.

Hoarding up of phosphorus during repair. Schmidt.

375 c. A hoarding up of phosphorus also takes place while the organism is repairing its losses. Thus Schmidt found that in a cat, after privation of food, the phosphoric acid excreted was for a time only one-third of the normal quantity, even after the cat had been again put upon a sufficient supply of food; and Mosler (Day, 'Physiological Chemistry,' p. 319), has substantiated this observation by experiments on the human subject. The excretion of the phosphates, therefore, may be taken as a measure of the wear of the *phosphide* element in nervous matter.

Mosler.

Decrease of phosphide element consequent upon exhaustion followed by decrease of general oxydation.

376. The consequences of the phenomenon or feeling of exhaustion do not, however, stop at the waste of the *immediately available phosphide* element contained in the nervous system. As this element exists in the albuminoid principles which constitute the bioplasm or histogenic stock from which all the organs and tissues of the system are formed; as there must be a balance between the proportions of this element contained in the different parts of the system, we have a right to infer that its decrease in one part must, after a certain time, produce a corresponding diminution in the rest; and, as we have found that this *phosphide* element is probably the exciting and initiatory agent of intra-organic molecular combustion (331), whatever produces a waste of the oxydizable phosphorus in the system must diminish general molecular oxydation, and the amount of excreted carbonic acid.

Chemical proofs.

377. Now this is what really does take place, for, if we bring together the analytical results afforded by the urine and those given by respiration, we shall see that, in certain cases, there is a strict correlation between the urinary phosphatic excretion, which measures the waste of oxydizable phosphorus, and the excretion of carbonic

acid, which is proportionate to the general oxydation of the system, and whose fluctuations indicate the greater or less intensity of molecular change. Just as we have seen (375) that the secretion of the phosphates diminishes during sleep, so a number of observers:—Prout ('Annals of Philosophy,' 1813, vol. ii. p. 328, and vol. iv. p. 331); Horn ('Neue Medicinische Zeitung und Gazette Medical,' 1850, p. 902); Hervier and Saint-Lager ('Comptes Rendus,' 1849, t. xxviii. p. 260); Boussingault ('Annales de Chimie,' 1844, t. xlv. p. 444); and Scharling (Ibid. 1843, t. viii. p. 492), have shown that during sleep the proportion of carbonic acid also undergoes considerable decrease (Milne Edwards, 'Leçons sur la Physiologie et l'Anatomie comparées,' Paris, 1858, t. ii. p. 527). Just as we have seen that want of food diminishes the excretion of the phosphates (375 B), so also Boussingault ('Annales de Chimie et de Physique,' 3^{e} série, t. xi., p. 448); Marchand ('Journal für practische Chemie,' von Erdmann und Marchand, 1844, Bd. xxxiii. S. 129); Bidder and Schmidt ('Die Verdauungssäfte und der Stoffwechsel,' Mittau, 1852, p. 318), have shown that it produces the same effect on the excretion of the carbonic acid. As during a period of fatigue and exhaustion, there is a decrease in the phosphates (375), so Milne Edwards (*loc. cit.* p. 535) has pointed out that there is a notable decrease of the carbonic acid evolved by the lungs, whether the cause of this exhaustion be excess of muscular labour, or of intellectual work, or depressing passions. Thus there is an intimate connection between the oxydation of the proximate principles containing the *phosphide* element and that of the other organic materials, since the same causes produce corresponding effects upon these two series of phenomena. Every kind of activity, whether intellectual, emotional, locomotory, or sensual, is therefore conditioned, either directly or indirectly, by a wear of the *phosphide* element, as shown by the excretion of the phosphates; and this activity must not exceed a certain limit, or else the organism is no longer in a normal state.

The phosphide element and vital power.

377 A. Whenever the state of activity is sufficiently intense, or sufficiently prolonged to produce the molecular condition of the nervous system, characterised by the sensation of fatigue, and above all, by that of exhaustion or prostration, it will, unless followed by nutrition and rest sufficient to restore the equilibrium, create in the system a *deficit* of the most mobile elements, that is, the most oxydizable, and among them those which contain the *phosphide* element. Hence will result in the system that permanent deficiency of the oxydizable phosphorus compounds to which I have given the name of phospholigy. This gives us the key to that state of weakness and exhaustion, which, according to the best pathologists, is the characteristic sign of the tubercular diathesis. We are no longer compelled to seek for an explanation of this condition in the vague idea of a variation in the intensity of some unknown force, called vital activity or vital force, acting as a kind of regulator of biological phenomena (315). We find that the increase or decrease in the intensity of these phenomena corresponds to molecular changes in the nervous substance, which, amongst other conditions, are directly connected with the more or less rapid oxydation of variable quantities of that proximate nervous principle which contains the *phosphide* element.

Causes of tuberculosis.

378. We thus see that the causes of tuberculosis, those which produce the tubercular or constitutional diathesis are, first, all those conditions which diminish the *phosphide* element in the system, by inducing fatigue or exhaustion without corresponding repair; next, all those which impair or diminish general nutrition, and thus interfere with the reintegration of the *phosphide* element in the system. To the first class of causes may be referred nervous excitement, mental fatigue, excessive emotion, long-standing disease, surgical operations, too rapid growth,

pregnancy, lactation, temperament and civilization. To the second, incomplete or insufficient food and digestive disturbance. By examining the influence which has been attributed to these and the other causes of tuberculosis we shall see that they confirm the conclusions arrived at.

Nervous excitement and insanity.

379. According to Voppel, nearly one half of the *insane* (five-elevenths) are attacked by tuberculosis. In acute mania *two-thirds* of the patients become tubercular ('Jahresbericht aus der Landes-Versorgungsanstalt für seelengestörte Männer zu Colditz;' Schmidt's 'Jahrbücher,' Bd. lxxxviii. S. 98). This greater frequency of tuberculosis in the acute form of mania has also been observed by Gauster ('Rückblick auf die Leichenobductionen an den im J. 1853 in der Wiener Irrenanstalt Verstorbenen. Wiener Zeitschrift,' xi. 1856; and Schmidt's 'Jahrbücher,' Bd. lxxxix. S. 97); and by Alexander Sutherland ('Medico-Chirurgical Transactions,' v. 38; and Parkes 'On the Urine,' p. 269). Boyd has stated that out of 295 deaths among the insane, 147 were due to disease of the respiratory organs, chiefly phthisis (Laycock's 'Lectures on the 'Physiognomical Diagnosis of Disease,' 'Medical Times,' March, 1862).

Thus, on the one hand, we see that an increase of nervous excitement, or brain-waste, corresponding to an increase of phosphatic excretion (359) is due to exaggerated oxydation of that *phosphide* element, which is one of the constituents of nervous substance (374, 375); on the other hand, we see that those who are subject to this nervous excitement are, for the greater part, attacked by tuberculosis; and again, we know that all the phenomena depending upon the tubercular diathesis, and which are not kept up by a local lesion, disappear by the scientific administration of the hypophosphites. Are we not, therefore, bound to conclude that there is a direct correlation of cause and effect between tuberculosis and the waste of the phosphide elements in the system?

380. *Excessive intellectual fatigue, the passionate emotions*, and chief among them grief, are often the starting-point of tuberculosis. There are no statistical data bearing upon these different points, but all who have much experience in the treatment of phthisis, particularly among the better classes of society, know how often it may be referred to causes of this kind (391). The great Laennec, the inventor of auscultation, who himself became a victim to consumption, says: 'Among the causes of pulmonary phthisis I know of none more certain than grief or melancholy, above all, when deep or prolonged. Almost all the persons whom I have seen become consumptive, and who did not appear constitutionally predisposed to the complaint, have seemed to attribute the origin of their complaint to long and deep mental suffering' ('Traité de l'Auscultation médiate,' Paris, 1822). Castellani of Bologna ('Bolletino delle Scienze Medicale di Bologna,' 30 April, 1860) asserts that he has produced tuberculization in cats and dogs by keeping them in a state of excitement and melancholy, either by depriving them of their young or by preventing the satisfaction of sexual appetite. But Perroud ('De la Tuberculose,' Paris, 1861, p. 199) correctly remarks that before we can admit this conclusion we should require a larger number of experiments of this kind. The connection between the oxydation of the phosphide element and the modifications of the nervous system corresponding to these different mental states has only been chemically determined with regard to mental activity (374—377). In this latter case the researches of Hammond ('American Journal of the Medical Sciences,' April, 1856; and Parkes 'On the Composition of the Urine,' London, 1860, p. 92), and, above all, those of Mosler ('Studien zur Urologie,' 'Archiv des Vereins für Wissenschaftliche Heilkunde,' Bd. I. S. 571; and Parkes *loc. cit.*) have shown that the quantity of excreted phosphoric acid and brain-waste are

Mental fatigue. Excessive emotion.

in direct proportion to one another. Mosler has found that in some cases the quantity of phosphoric acid thus excreted may be increased one-half.

Excessive fatigue.

381. *Excessive fatigue* and want of exercise, although apparently opposed causes, equally tend to produce tuberculosis. The first produces exhaustion, and acts in the same way as the causes we have already studied (373).

Want of exercise. Lombard.

382. *Want of exercise*, according to Lombard, has a great influence in the development of phthisis. Out of 230 deaths by phthisis 141 were of persons following sedentary occupations, and only 89 of persons actively employed. We can understand how the want of muscular exercise may have a double action in the development of phthisis. It may act either as a cause of tuberculosis or as a favourable condition of tuberculization. According to the researches of Lhéritier (271), the *phosphide* element is more abundant in adults than in the young or the old. This would point to a probable correlation between the quantity of this element and the development or improvement of the muscular and locomotor system, so that if the latter becomes atrophied from want of exercise, the *phosphide* element may diminish likewise.

Balance between nerve and muscle explained

383. It is a well-known fact that there seems to exist a kind of antagonism between the activity and the development of the nervous system and those of the locomotive system, and that it is necessary for the full development of the individual to keep up the balance between them. Of this no explanation has hitherto been given, but here perhaps we have the clue to it. Not only is the want of exercise a cause of tuberculosis, but for such as already suffer from incipient or slight phospholigy, the complete deprivation of it may also be a cause of tuberculization, since musculation and locomotion are two of the conditions which contribute to the energy and completeness of oxydation and to the general health.

Captivity.

384. If to the want of exercise be added, as is often

the case, *captivity* and its accompanying mental depression, the two causes combined will intensify each other.

Protracted disease. Surgical operations.

385. *Convalescence* after protracted disease or serious surgical operations, *low diet*, *excessive secretion*, *wasting* by fever, or *suppuration*, all produce the same results in the system as excessive fatigue. In all of these cases, if nutrition is languishing either through insufficient food or through impaired digestion, we shall witness that particular condition of the general system which produces in the nervous apparatus of organic life the feeling of exhaustion, or prostration, and of which we have shown phospholigy to be the correlative. This influence of the condition of the nervous system is so strongly marked that many pathologists have considered tuberculosis to be produced in the lungs by a disturbance of the nervous system; and Cheneau ('De l'Influence de la huitième paire dans la production de la Phthisie,' Paris, 1842) has gone so far as to attribute it directly to the disturbance of the nervous influx of the eighth or pneumo-gastric pair which supply the lungs, this disturbance itself being referable to abnormal cerebral conditions.

Rapid growth. Lactation and pregnancy.

386. *Rapid growth*, *suckling*, and *pregnancy* have been looked upon as direct causes of tuberculosis, particularly the two former (331, 336, 337, 389). These facts are not established upon statistics, but all physicians who have seen many consumptives have noticed the action of the two first-mentioned causes. Rayer, in his valuable researches on pulmonary phthisis in man as compared with animals ('Archives de Médecine comparée,' Paris, 1843, p. 192), states that wet-nurses generally become consumptive, either through nursing two children at once, or when lactation is prolonged beyond their strength. Huzard, Delafond, Huzard the younger, and Bouchardat ('De la Tuberculization,' pp. 10, 11, 'Annuaire de Thérapeutique,' 1861) state that almost all the milch cows kept in the neighbourhood of Paris die of pulmonary tuberculosis.

Rayer.

Wet nurses

Bouchardat.

Milch cows.

Sexual excess.

387. *Sexual excess* acts in a twofold manner—in the male by the waste of the phosphide elements contained in spermatic matter (284); in both sexes by the fatigue and wear of nervous substance. This is one of the most powerful causes of tuberculosis, particularly in the young at the period of growth (389).

Insufficient nutrition.

388. Like the preceding, *insufficient nutrition*, whether from want or imperfection of food, or from digestive disturbances, such as dyspepsia, is also a direct condition of tuberculosis. Not only has chemical analysis shown that there is then a deficiency of the phosphide element (375B), but insufficient nutrition is characterized by the phenomenon of exhaustion, which we have seen depends upon that particular state of the nervous system correlative with the want of that element (373).

Age. Youth. Growth. Guersant.

389. *Age* has a notable influence on the development of phthisis. My late friend Guersant, who was for many years at the head of the Hospital for Sick Children in Paris, states that tubercular deposit was found in five-sixths of the *post-mortem* examinations of children made by him. This predisposition to tuberculosis varies at different ages, and is most strongly marked during periods of growth and organic development.

Papavoine.

Papavoine gives the following proportions of tubercular and non-tubercular subjects, in 709 children of ages varying from two to fourteen years (Louis, 'Recherches sur la Phthisie,' Second Edition, Paris, 1843, p. 576):—

Age.	Tubercular.	Non-tubercular.		Proportion of tubercular to non-tubercular.
2	73	110	::	7 : 11
3	64	64	::	1 : 1
4	46	24	::	2 : 1
5	35	13	::	$2\frac{2}{3}$: 1
6	32	14	::	$2\frac{1}{2}$: 1
7	29	10	::	3 : 1
8	24	14	::	$1\frac{5}{7}$: 1
9	16	8	::	2 : 1
10	18	13	::	$1\frac{1}{2}$: 1

Age.	Tubercular.	Non-tubercular.		Proportion of tubercular to non-tubercular.
11	12	8	::	1½ : 1
12	24	8	::	3 : 1
13	10	5	::	2 : 1
14	11	10	::	1 : 1
Age not noted	14			
Total	408	301		

Hence it appears that among children the periods of life most subject to tuberculosis are the ages of seven and twelve and thirteen, that is to say, the period of dental evolution, and the approach of puberty, reminding the reader that the above table applied to French children.

These important facts are all explained by the phospholigic theory of tuberculosis. We have seen that in the young there is less of the phosphide element both in the muscular (382) and in the nervous system (271). Hence, if the formation of new tissues entails the consumption of this element, growth will be a constant cause of phospholigy and tuberculosis (331, 336, 337).

Adult mortality.

390. The greater intensity of tuberculosis in adult life is also thus accounted for. From twenty to forty is, as we have seen (7), the time of life when phthisis is most fatal, as it then kills nearly as many people as all other-diseases united, because that is the time when not only nervous and cerebral activity are most developed; but also when most of the different causes we have enumerated as representing the wear and tear of life come into action (381—388). We shall find that it is the same with the causes of tuberculization.

Temperament.

391. Tuberculosis depending upon the waste of the phosphide element, which is one of the most important principles of the nervous substance, we might conclude that what is called the *nervous temperament* must be one of the conditions most directly predisposing to it (383). With some persons the feeling of exhaustion which follows over-fatigue occurs but seldom, or is induced with

difficulty (373). Others are endowed with such extreme nervous excitability that the feeling of exhaustion follows almost every intellectual, emotional, or incitatory phenomenon. Between these two extremes we meet with every intermediate degree, but, as stated at the very outset of my discovery (see the first edition of my French work, 1857, p. 253), this excessive sensitiveness of the nervous system is one of the most striking characteristics of the tubercular temperament. Since then, Edward Smith's researches have afforded statistical proof of the soundness of this opinion. He found that in 1,000 cases of phthisis 72½ per cent., or nearly three-fourths, were of a nervous or over-sensitive temperament. This fact of a connection between acute sensibility and phthisis is so striking that poets of all times and all countries have employed their most touching accents to deplore the premature fate of some of those victims to consumption whose youth was bright with promise of future excellence and distinction and who, as the French poet says,

Over-sensitiveness.

Ed. Smith.

Bloom for a morning like the rose,
Then like it, fade away.

The memory of every educated man can recall, from Marcellus to Keats, instances of the kind, and there are few who cannot find them among their own familiar acquaintances. Excessive delicacy of feeling, ardour of affection, vivacity of imagination, precociousness of intellect, all these are but too frequently signs or forerunners of phthisis. Those whom Heaven seems to have endowed with the seeds of all that is most noble and elevated in the head or in the heart of man, are the most likely to fall victims to this fell disease—those 'whom the gods love die young.' It was this that justified the idea

Optima prima feræ manibus rapiuntur avaris
Fortunæ.

A physician, to whom I shall have occasion to refer further on, has, contrary to this predominant opinion, which has swayed mankind in all ages, broached the certainly novel theory that 'pulmonary consumption is a bountiful dispensation of Providence to eliminate the weak and imperfect, and thus purify the earth, in order to save us from becoming a race of pigmies, of sickly dwarfs, and eventually dying out.' The most superficial every day observation will show us how unfounded is this view. Until affected with the disease few show greater, not only mental, but often physical promise than the consumptive. Dr. Henry Bennet, himself an ex-consumptive, has taken somewhat too subjective a view of the question (491).

Civilization.

392. From what precedes it follows that as *civilisation* tends to develope the nervous system, to increase both its sensitiveness and its activity, it must be one of the most powerful causes of phospholigy and of the tubercular diathesis. Several observers, among the rest Escherich ('Über den Einfluss geologischer Bodenbildung auf Krankheitsdispositions, insbesondere auf Scrofulosis und Tuberculosis, in Allgemeine Zeitung für Chirurgie, innere Heilkunde,' etc., Nos. 30 *et seq.*, 1843; Schimdt's Jahrbücher, Bd. xlii. 6. 34), have shown that there is a direct connection between civilisation and the frequency of phthisis. Our present transitory and imperfect state of civilisation is also, as already said, the chief cause of the etiolation of many of the labouring classes, thus preparing the way for consumption (189, 190). A number of observers have studied this deterioration of population, and shown the connection between it and poorness of blood, due to chloro-anæmia or other causes. But among these the anæmia of phospholigy will certainly be found the most important. I will merely mention, H. C. Richter ('Blutarmuth und Bleichsucht die verbreiteste Krankheiten der Jetztzeit,' Leipzig, 1850); Pollitzer ('Die Blutarmuth, Bleichsucht und ihre verwandten Zustände als vorwiegender physischer Character unseres Zeitalters: Zeitschrift der Gesellschaft Wiener Aerzte,' 1857); Burggraeve ('De

l'Importance de l'Hématologie pour la Conservation de la Santé et la Prolongation de la Vie,' 'Bulletin de l'Académie de Médecine de Belgique,' 1857, tom. xvi. p. 693). That in this age of sanitary professors and sanitary humbugs, this cause of disease will attract the attention of those who govern, it would be childish to expect or to hope. If the means of prevention involved some enormous outlay, required some stupendous engineering enterprise, and thus opened a field for some enormous contract, were big with the fate of cabinets, or even influenced an election in some petty borough, no doubt they would attend to it. There is one consequence, however, which perhaps may excite some little attention on their part, that is, the decreasing stature and strength of recruits for the army. Food for powder will always be in request, and perhaps some Government official may be bold enough, some centuries hence, to try the effect of the hypophosphites in promoting the growth and development of military recruits (126).

Temperament in animals.

393. Comparative pathology coincides in its results with what has been just stated as to the influence of temperament upon consumption. Just as development of the nervous system in man makes him more prone to tuberculosis, so is it with animals. Rayer, in his valuable rerearches, to which reference has so often been made, shows that the liability of animals to tuberculization increases with the perfection of their organization, and the development of the nervous system. According to him, our Darwinian congeners, monkeys, are as subject to phthisis as we ourselves. Mammifers are more prone to it than birds. These latter more so than reptiles and fishes. In insects tubercle does not exist or can no longer be recognized. Thus says Rayer: 'Tubercular phthisis is met with in so many of the vertebrates owing to the common features of their organization. As these resemblances decrease, the characteristic forms of tubercle be-

come confused, and are no longer recognizable in the present state of our knowledge.'

394. The same acute observer also gives us facts in support of what has been said with regard to the influence of civilization, by showing that it acts upon animals in the same way as it does upon us. Phthisis is almost unknown among wild animals. It is frequent among the domesticated.—Rayer ('Étude comparative de la Phthisie pulmonaire chez l'Homme et chez les Animaux,' 'Archives de Médecine comparée,' p. 218). Civilization in animals.

395. The starting point of all constitutional predisposition is to be sought for in the law or condition which physiologists have called 'Heredity.' By inheriting from his parents, in a manner as yet obscurely understood, those special modifications of the system which we have just studied, the consumptive receives the tubercular predisposition. Some observers, among others Walshe, whose opinion, on pathological subjects (I do not say therapeutical) is of great weight, have endeavoured to show that inheritance exerts but a slight influence in the production of phthisis (Walshe 'On Diseases of the Lungs,' pp. 461, 462). But any physician need not go far to find instances of several members of the same family, or sometimes the whole of them, being swept away by it. The question need not be discussed here, as it has no direct connection with the subject. The reader must only be reminded that hereditary phthisis is even more fatal under ordinary treatment than non-hereditary; but that with the use of the hypophosphites the contrary takes place (67, 68). In the second edition of my French work ('De la Cause immédiate de la Phthisie,' etc., Paris, 1864) will be found two cases (Observations 41 and 42, pp. 213, 216) of two children cured by the hypophosphites, when all the rest of the family except their mother, consisting of the father and six brothers or sisters had died of the complaint. These children, who were both in Heredity.

an advanced stage of phthisis, were seen by me more than eight years after their recovery, and had both grown healthy and strong. I have since then had many instances of the same kind, among others, a Spanish gentleman in a very advanced stage of the disease, with both lungs affected, and the whole of whose family, consisting of both parents and three brothers, had died of the disease. This patient, who had begun his treatment with me in Paris, was cured by means of the inhalants and the hypophosphites in London, during the severe winter of 1870–71, since which time he has continued in perfect health.

Conditions of tuberculization. 396. The conditions of tuberculosis, that is to say, of the constitutional diathesis, having now been recognized, what are the secondary circumstances, which, by being superadded to this initial phenomenon, induce tuberculization, or the deposit of tubercular matter in the different organs? what, on the other hand, are the circumstances which may impede, diminish, or delay this deposit?

We have seen that the first consequence resulting from phospholigy is a decrease of that nervous energy of organic life, which has hitherto been referred to by physicians and physiologists as to a kind of occult cause under the name of vital power. This leads, as a necessary correlative, to a diminution of the capacity for oxydation of the proteic or albuminoid material (331, 377A), which being once established, any circumstance which further impairs oxydation will promote among the phosphologic the development of tubercles; any contrary condition will impede this deposit. This is a very complicated subject, which has hardly been studied hitherto. Only within the last few years have chemists endeavoured to determine the conditions which influence the slow and gradual reactions which take place between bodies endowed with weak affinities like the organic principles. It is to Berthelot, in his admirable researches on the synthesis of organic bodies ('Chimie organique fondeé sur la Synthèse,' Paris, 1860, t. ii. liv. iv. chap. 1), that we owe the little that has hitherto been discovered about them, and until I wrote on them ten years ago they had led to no application in physiology or pathology.

Molecular reactions. Their conditions.

397. The conditions which influence the molecular reactions in living bodies are either *physical*, *chemical*, or *organic*. The most prominent, if not the primary one of all chemical conditions in the animal system has already been elucidated in the preceding part of this chapter. The two other kinds will now be investigated. The physical conditions which influence oxydation are three in number, the quantity of oxygen (398), the temperature of the reaction (401), and the duration of contact (411). The principal organic conditions by which it is modified are the respiratory frequency (413), the activity of the circulation (414), and the energy of molecular change (416). Each of these in its turn implies several elements.

Quantity of oxygen.

398. The relative quantity of oxygen, or of any gas, in contact with another body influences the nature of the combination which takes place between them. Thus, when phosphorus is burnt in a limited space and air is only admitted by degrees, it forms what was formerly called phosphatic acid, $P^3\ O^{13}$, that is to say, a combination in which the whole of the phosphorus is not completely oxydized. This was formerly supposed to be a definite compound, but has since been ascertained to be merely a mixture of phosphorous and phosphoric acids ($P^3\ O^{15} = 2\,PO^5 + P\,O^3$). When air is freely admitted to the burning phosphorus, or the latter is in presence of an excess of oxygen, the whole of it is completely oxydized and transformed into phosphoric acid ($3\,P + 15\,O = 3\,P\ O^5$). The same thing takes place in the transformation of alcohol $C^4\ H^6\ O^2$ into vinegar. If the quantity of air is insufficient aldehyde is at first formed $C^4\ H^6\ O^2 + {}^2O = C^4\ H^4\ O^2 + 2\,H\,O$, while, when a sufficient quantity

of air is admitted, the alcohol passes into the state of acetic acid $\overset{\text{Alcohol.}}{C^4\,H^6\,O^2} + \overset{\text{Oxygen of atmosphere.}}{4\,O} = \overset{\text{Acetic acid.}}{C^4\,H^4\,O^4} + 2\,H\,O$. It would be easy to multiply instances of this kind.

Confined air.

Over-crowding.

Guy.

399. The same conditions applied to the animal system must produce corresponding results. If a person suffering from phospholigy breathe an air which contains less oxygen than in the normal condition, as there is already a decrease of the phosphide elements, that is of those which have most affinity for oxygen, these two different causes will both concur in producing imperfect oxydation, and consequently in creating and precipitating tubercular matter in the system. Guy has established the influence of the want of oxygen in the production of tubercles by some very interesting researches. He found that among printers the number of subjects attacked with hæmoptysis and lung disease, generally phthisis, was directly connected with overcrowding. Thus, where the amount of respirable air fell below 500 cubic feet, twelve-and-a-half per cent. suffered from hæmoptysis, and the same number from cough. When the volume of respirable air was between 500 and 600 cubic feet, the number suffering from hæmoptysis fell to 4·35 per cent., of those suffering from cough to 3·48 per cent. Lastly, when the volume of respirable air exceeded 600 cubic feet the number suffering from the first complaint was only 3·96, and from the second only 1·98 per cent. ('On the Sanitary Condition of the British Army,' London, 1858, p. 27.)

A secondary cause of phthisis.

399A. But overcrowding is not, as has been supposed, a direct and proximate cause of tuberculization. It is only an accidental condition, which determines the production of tubercle in those who are already suffering from the phospholigic diathesis. This has been established by Tholozan ('Sur la Mortalité du Service militaire,' 'Gazette médicale de Paris,' Nos. 23, 24, 27, 1859). This observer has shown that if among the French troops in barracks the mortality from phthisis, which was much greater than in civil life, might be attributed to overcrowding and want of oxygen, on the other hand, among French troops in the field and sleeping in tents the mortality from phthisis fell to its lowest point, although overcrowding was much more considerable than in barracks, and twenty times greater than in civil life. Although the want of the vital gas is therefore one of the most powerful causes of tuberculization, it will not alone and of itself give rise to tubercule, as has been supposed by Beddoes and MacCormack ('The Nature, Treatment, and Prevention of Pulmonary Consumption,' London, 1858; 'Theory of Consumption,' London, 1858).

Proofs.

Oxygen not a remedy for phthisis.

399B. This is not only proved by the fact that animals may be kept insufficiently supplied with air, or in an atmosphere containing carbonic acid or other non-deleterious gases without becoming consumptive, but by the ill-success of the therapeutical use of oxygen against phthisis, which was advocated and carried out upon a large scale by Beddoes and Watt at the end of the last century. (Watt and Beddoes 'On the Use of Factitious Airs.')

399C. The use of protoxyde of nitrogen, on account of its oxydizing properties, by Campbell ('Observations on Tuberculous Consumption,' London, 1841, p. 314) and Richardson ('The Medical Circular,' 1862) has been attended by no better results. The same has been the case with ozonized oils, which also are powerful oxydants, used by Theophilus Thomson ('Observations on the Medical Administration of Ozonized Oils,' 'Medico-Chirurgical Transactions,' vol. xlii. p. 349, London, 1859). All these various results concur in proving that not only excess of oxygen will not cure tuberculosis, but also that a deficiency of oxygen *alone* will not produce it.

Inefficacy of rarified and compressed air.

400. The same remark applies to the use of rarefied or of compressed air, which although completely opposed

to one another in their action, have both equally led to no definite results.

Temperature.

401. The temperature at which two bodies, which may combine, happen to be at the moment of their contact exercises a powerful influence over their reaction, and the nature of the combinations which may result from it (397). Many bodies which would not unite at the ordinary temperature become active with a greater amount of heat. When once the reaction has begun it sometimes produces sufficient heat of itself to continue the process without any additional heat from the surrounding medium. Many applications have been made of this fact, such as the friction matches already mentioned (338). In other cases the heat produced by the combination is not sufficient to keep up the process, and if the temperature by which it was initiated is lowered, the reaction stops or produces different results. It may be said in a general way that chemical reaction becomes more active with increase of temperature, as long as this increase does not exceed a certain limit, because every chemical reaction, and consequently the existence of the bodies which it produces, is bounded by two limits of temperature, one below which the reaction ceases, and the other above which it cannot take place, because the compounds which result from it can no longer exist.

Limits of temperature in bodies.

402. In this respect there is a kind of progressive scale in the different forms of matter. Thus the distance between the limit of temperature at which a compound originates and that at which it undergoes decomposition is in general greater for natural inorganic than for organic substances, and greater for the latter than for organized bodies.

In organised beings.

403. The same progression is likewise seen among living beings. As they rise in the scale of life, we find that the conditions of temperature by which the existence of each order of beings is bounded gradually become

narrower. There are many exceptions to this rule, which we cannot explain in the present state of our knowledge, but on the whole it is undoubtedly true. We should, however, have but a very imperfect and superficial idea of the influence of temperature on living beings, if we only considered its effects upon each organism in the mass. Deeper examination shows that its general effect upon each individual is only the sum total of the series of partial effects, resulting from the influence of temperature upon each of the vital acts.

In vital acts.

404. Just as is the case with chemical reactions, every vital phenomenon is strictly bounded within two extreme limits of temperature, beyond which it cannot take place. Examples of this influence in vegetables are germination, growth, flowering, and the ripening of fruit: in animals, the sleep of hibernating creatures, the torpidity and sleepiness which come on under the influence of extreme cold, the periodical recurrence of heat, and the influence of temperature upon the excretions of the skin and of the kidneys. But although there can be no doubt as to the influence of temperature upon the animal functions in general, it has not been studied with sufficient method and precision to enable us to say what are its exact effects upon each in health and still less in disease. We are only in possession of certain general and rather vague data. We know, for instance, that increase of temperature augments, and fall of temperature diminishes certain functions, such as innervation, circulation, and cutaneous excretion, while an inverse effect is produced upon respiration, digestion, musculation, and urinary secretion.

Influence on phthisis of variations of temperature.

405. In spite, however, of these deficiencies, let us see whether the influence of variations of temperature in the production of phthisis can be referred to the previous existence of phospholigy. Here are the facts: The action of cold as a determining cause of tuberculization has been

established by a number of observers. Thus Briquet ('Revue médicale,' February, 1842; Schmidt's 'Jahrbücher,' Supplement, Bd. S. 254) out of 109 cases of phthisis referred 52 cases to this cause. So Scott Alison (the 'Lancet,' 1858) found that out of 603 patients, 336 attributed the origin of their complaint to cold or to changes of temperature. This is confirmed by Ancell ('On Tuberculosis,' p. 427), by Perroud ('De la Tuberculose,' p. 189), by Edward Smith (Paper read to the Medico-Chirurgical Society of London, 'Medical Times,' March, 1862), and by Gallerand ('Considérations sur la Navigation dans l'Océan glacial,' 'Union médicale,' March, 1858).

Explanation.

406. The effect of cold on tuberculization thus being established, how is this explained upon the theory of phospholigy? At first nothing seems more easy. If the capacity for oxydation of some of the proximate principles of the system is already lowered by a decrease in their normal quantity of the phosphide element (344 A), any fall of temperature which would diminish the oxydation of organic matter, will increase this tendency and raise it to a degree sufficient to produce tubercular deposit, which, as we have seen, is only nutrimentary material insufficiently oxydized.

Objection.

407. But here we meet with an objection which at first sight appears insuperable, which is, that as the temperature of the body is lowered, the quantity of carbonic acid excreted by the lungs far from being diminished is increased, as is shown by the experiments of a great number of physiologists, such as Crawford, Delaroche, Letellier, Regnault and Reiset, Vierordt (Milne Edwards' 'Leçons de Physiologie,' t. ii. p. 548, *et seq.*). So that in this case, instead of there being a decrease, there is an increase of the sum total of intraorganic combustion. At first sight this is a serious objection; more attentive examination shows that these things are not so simple as they seem, and the objection disappears.

Answer.

408. If we study the respiratory phenomena in the animal series, we find that it appears at first sight altogether different in the two classes of cold-blooded and warm-blooded animals. In cold-blooded animals which are more appropriately called animals of variable or dependent temperature, all the phenomena of organic metamorphosis consequent upon respiration, and the activity of which may be calculated by the quantity of expired carbonic acid, are, as in the case of vegetables, under the direct influence of temperature, and they increase or diminish just as the temperature of the animal rises or falls with the thermometrical variations of the surrounding medium. With these animals when the temperature rises oxydation increases; it diminishes when the temperature falls. This point has been settled by the researches of a great number of physiologists. In warm-blooded animals, which might be better called animals of constant or independent temperature, there appears to be a different state of things, although this difference, at least as far as concerns our present subject, is more apparent than real. In animals of this class, in consequence of their improved organism, the vital phenomena are included within much narrower limits of temperature than for cold-blooded animals (403). For these latter the temperature of the body may vary to the extent of 35 to 40 centigrade degrees for certain animals, and for infusoria even to 80 and 100 centigrade degrees without stopping the essential functions of life. In animals of independent temperature the variation is much smaller, and in the case of man does not exceed 6 or 8 degrees (Longet, 'Traité de Physiologie,' Paris, 1861, vol. i. p. 1144).

Cold-blooded animals.

Warm-blooded animals.

Function of calorification.

408 A. In order to maintain this equilibrium of temperature, which is indispensable to them, warm-blooded animals are endowed with a special faculty, that of maintaining their own heat at a fixed point, which, to a certain degree, is independent of the medium in which

they live. They are endowed with a special function of calorification or refrigeration, by which, to a certain extent, they escape the action of the external temperature. The particular conditions upon which this fixity of temperature depends, are only partially understood. But two of them have already been discovered, one is a greater increase of respiratory action, the other the improvement of organization, to which we have already referred (392, 393). Vierordt has shown that if the volume of air expired at a high temperature is 6,106 cubic centimetres, at lower temperatures it may be 6,672 or one-twelfth more. The influence of higher organization was first discovered by William Edwards ('De l'Influence des Agents physiques sur la Vie,' p. 182) who found that at birth the young of many warm-blooded animals have no proper heat of their own, and are only able to keep up their own temperature when they have reached a certain stage of growth.

Vierordt.

W. Edwards.

Influence of nerve-power on calorification.

408 B. It is not possible to state exactly what are the peculiar modifications of the system upon which this depends, and which we have indicated by the term *higher organization*. It is very probable, however, that they may specially be referred to the nervous system, which, as we know, has a direct influence upon calorification. The experiments of Brodie and of Claude Bernard ('Leçons sur la Physiologie et la Pathologie du Système nerveux,' Paris, 1858, 15e leçon) show that a section of the motor and sensory nerves is followed by a fall of temperature, while that of the sympathetic is followed by a rise. On the other hand, Doyère found that in cholera the temperature rose as high as 42 degrees centigrade just before death, although breathing and circulation were considerably impaired. ('Mémoire sur la Respiration et la Chaleur humaine dans le Choléra,' 'Moniteur des Hôpitaux,' 1854, p. 110.) We also know that the power of resistance to cold is proportionate in individuals to their vital, which,

as we have seen, means their nervous, power (377 A), as is shown by the less power of resistance to cold evinced by children or old and sick people (Longet, 'Traité de Physiologie,' t. i. p. 1108).

Cold requires greater waste of substance.

408 C. Thus we find that in cold-blooded animals, the oxydation of the living material is, as in the case of vegetables, directly influenced by the surrounding temperature, all the variations of which it follows. Warm-blooded animals, though experiencing the same influence, do so within much narrower limits, because they are endowed with the faculty of maintaining to a certain extent their own heat, thanks to two different conditions, namely, a greater expenditure of the combustible material, and a greater waste of nervous energy. Although, therefore, cold induces the production of an increased amount of carbonic acid, it nevertheless follows that it must be a powerful cause of tuberculization in the phospholigic, not only because it tends to diminish the completeness of the intraorganic oxydation (401), which is already impaired by the diathetic condition, but because the system is obliged to increase the activity of the pulmonary function, which, as we shall see further on, is a cause of tuberculization (413), and thus to make a greater expenditure of insufficiently oxydizable bioplasm, and above all of the nervous substance. We must, however, bear in mind that this action of cold only takes place if the heat of the body really is affected by the temperature. This explains why tuberculosis is not more frequent in northern latitudes, but rather less so than in temperate ones, and why the consumptive should be so very careful to keep themselves properly clothed and warmed.

Damp.

409. Damp cold is a still more powerful cause of tuberculization than dry, because as damp air is a better conductor than dry, it subtracts a greater quantity of heat from the system. Lehmann has shown experimentally that in a damp atmosphere the system requires to con-

sume a greater quantity of oxygen and to excrete a larger quantity of carbonic acid to keep up its temperature ('Lehrbuch der physiologischen Chemie,' Bd. iii. S. 303).

We thus see how these hitherto unexplained influences of cold and moisture, which had appeared inexplicable to many pathologists (Perroud 'De la Tuberculose,' p. 189), are directly accounted for by a previous condition of phospholigy, to which cold, either dry or moist, is superadded as an occasional or secondary cause.

Cold NOT a direct, but a secondary cause of phthisis.

410. The action of cold in bringing on the deposit of tubercular matter is so great that several pathologists have looked upon it as the direct cause of tubercle. Thus Fallot ('Discussion de l'Académie Royale de Belgique,' 'Gazette Hebdomadaire,' 1859), following out the idea originally propounded by Fourcault (313), thought that tubercular matter was nothing else but the result of cutaneous sensible or insensible perspiration stopped by cold and repercussed upon the internal organs. Other observers, like Fossion ('Note sur les Causes et la Nature de Phthisie pulmonaire,' 'Bulletin de l'Académie de Médecine de Belgique,' t. xvi. p. 139), have attributed the production of tubercle to the direct action of cold upon the pulmonary tissue. Undoubtedly cold is the starting-point of many cases of phthisis; still only of the smaller number, and we should have to seek elsewhere for the cause of the rest. Cold sets up inflammation of different kinds in the respiratory organs, but this inflammation is not always or even generally followed by tubercular deposit. In hot countries, where cutaneous perspiration is so active and its repercussion so common, I have seldom found this repercussion to produce tuberculosis, nor do I know that it has ever there been looked upon as the usual cause. As already said, Niemeyer and his followers look upon all caseous tubercle as the result of inflammation (349), but they have not shown why

in one case a patient should have caseous and in another only simple pneumonia under the action of the same cause. Many years ago my friend Professor Bouchardat ('De l'Étiologie de la Tuberculose,' 'Annuaire de Thérapeutique' pour 1861) endeavoured to prove that tuberculosis was owing to a deficiency of calorification, and brought forward a number of facts in support of this view, all of which may be explained and referred to the pre-existence of phospholigy, while there are a number of others which cannot be explained by a want of calorification. We know that the heat of the body is a result of the sum total of molecular organic changes which take place in it, so that even were it settled that its insufficiency produces tuberculosis, we should still have to seek for the cause of this very insufficiency itself.

Proofs.

410 A. There are, however, several striking facts which cannot be explained upon this theory. If insufficient calorification produced tubercle we ought to find it in cold-blooded and, above all, in hibernating animals, which sometimes undergo a fall of temperature amounting to nearly thirty degrees (Marshall Hall on 'Hibernation,' 'Cyclopædia of Anatomy and Physiology,' London, 1839, vol. ii. p. 767). Still more so ought this to be the case in the young of warm-blooded animals during the time they have no independent means of keeping up their own temperature. But it is not. Another kind of facts of an opposite character strengthen these first. How can we understand upon the theory of insufficient calorification that, as shown by Rayer ('Étude comparative de la Phthisie pulmonaire,' 'Archives de Médecine comparée,' Paris, 1843, pp. 195, 196), the reindeer, transported from Lapland into temperate climates, die of consumption? No doubt, as we have seen, insufficient calorification is a constant symptom of the tubercular diathesis (340, 344), but this is only a consequence of the insufficient molecular reactions in the system; they in their turn depend-

Marshall Hall.

Rayer.

ing upon the deficiency of the phosphide element, which is the initiatory principle. The insufficient calorification of the consumptive is, therefore, a secondary condition—an effect and not a cause. This once admitted, all the facts collected by the learned Professor of Hygiene of the Faculty of Paris completely square with my theory.

Duration of contact.

411. The third physical condition which modifies chemical combination, is the duration of contact (397). The longer this lasts the more complete will be the reaction, and the higher the degree of combination. This is constantly seen in chemical combinations, and depends upon a fact already examined, namely, the quantity of the combustible body compared with that of the comburant. The greater the former the longer time will it take to combine. Thus carbon in presence of a limited quantity of oxygen is first of all changed into oxyde of carbon, which in its turn may be completely oxydized and become carbonic acid. As Berthelot ('Chimie organique fondée sur la Synthèse,' Paris, 1860, t. ii. p. 447) says:—'The aldehyds gradually absorb oxygen and become acids. Alcohol is transformed more slowly still into vinegar and acetic acid; essences and liquid carbides pass in the same manner into the state of resins or balsams; drying oils become varnish, &c. These phenomena are quite similar to those which take place in mineral chemistry during the spontaneous oxydation of sulphurous acid, of sulphuretted hydrogen, the metallic sulphides, the metals, &c. Hence we are allowed to infer by legitimate induction that the same thing takes place during the series of slow transformations by which atmospheric oxygen, after being conveyed by the respiratory process into the animal tissues, acts upon the proximate principles therein contained, goes through a certain number of combinations, and is finally expelled in the shape of carbonic acid.' This influence of the duration of contact is fully established by physiological experiment. As the

In organic chemistry. Berthelot.

breathing becomes more frequent the quantity of carbonic acid exhaled for a given quantity of inspired air diminishes. 'The exchange,' says Milne Edwards ('Leçons de Physiologie,' t. ii. p. 574), 'which takes place between the atmosphere and the blood of the lungs is not instantaneous but continuous. It is evident that the time the respirable fluid remains in contact with the respiratory surface must exert an influence upon the quantity of oxygen which is absorbed, and of carbonic acid which is exhaled at each of the respiratory movements. This had been considered doubtful by some experimenters, but has recently been established by Vierordt, who found that the quantity of carbonic acid exhaled was proportionate to the time the air had remained in the lungs, and may be made to vary very considerably at will. Thus he found that the air expired during a series of respiratory movements contained six per cent. of carbonic acid, when he held his breath as long as he could, while it contained rather less than three per cent. when he breathed as rapidly as possible. When only breathing six times a minute, and thus keeping the air in the lungs for about ten seconds each time, he found it contained $5\frac{9}{10}$ths per cent. of carbonic acid. This proportion diminished gradually with the frequency of the respiratory movements. If the number of expirations reached 130 or 150 a minute, the proportion of carbonic acid fell as low as $2\frac{8}{10}$ths per cent. of the volume of air expired.'

In the animal system the duration of contact of the atmospheric oxygen with the intraorganic material depends chiefly upon two causes, the frequency of the respiratory act and the activity of the circulation. We must proceed to examine the influence of each of these functions separately, and this leads us to the third set of circumstances, the organic or biological conditions of oxydation.

412. As already stated, the principal organic conditions Biological conditions.

of molecular oxydation.

which modify molecular oxydation are respiration, circulation, and the activity of molecular metamorphosis (397).

Tuberculization favoured by frequency of respiration.

413. The office of respiration being to place the organic material in contact with the oxygen of the atmosphere as the bioplasmic material is incompletely oxydized in case of phospholigy, owing to the decrease of its affinity for this gas, the quantity of incompletely oxydized matters will increase in proportion as the respiratory act becomes more frequent, because the air will remain for a shorter time in contact with the substances to be oxydized (411). Anything, therefore, which increases in the phospholigic the frequency of the respiratory act, or which augments the work of the lungs, will promote tuberculization. This explains the injurious effect upon the phospholigic pointed out by Perroud ('De la Tuberculose,' Paris, 1861, p. 252) and other observers of singing, declamation, and the playing of wind instruments. For the

By cold.

same reason cold, as already seen (410), has a double action in producing tuberculization: it impairs oxydation (401) while at the same time it increases the work which is required of the lungs (408). We can thus understand why exercising the lungs by means of long and forced inspirations, as recommended by several physicians, such as Celsus, Rush, and Piorry, can produce no curative result. If the amount of the initiating combustible element, phosphorus, has diminished in quantity, and so is insufficient to produce adequate oxydation of the other materials, the number of respiratory acts will not influence the quality but only the quantity of the resulting products. These will still continue to be abnormal, although they may be less abundant if pulmonary activity is lessened. Hence we cannot expect the use of forced or prolonged inspirations to be either a curative or a preventive means against phthisis. The same remark holds good with regard to the use of condensed or rarefied air (400).

413 A. Andral and Gavarret ('Essai d'Hématologie

pathologique ') have shown that menstruation is a kind of diverticulum or supplementary act which relieves the respiratory function. They discovered that women during the period of life when this function is in activity exhale less carbonic acid, that is, require less respiratory work than men, while in childhood and old age they breath in the same manner. This gives the reason why amenorrhœa, as pointed out by Perroud, may be an occasional cause of tuberculization, as during amenorrhœa the work the lungs have to do is increased. By amenorrhœa.

414. The way in which the circulation is carried on influences the oxydation of intraorganic material, and consequently may promote or retard the production of tubercle (397). The two chief circumstances which may act in this way are the rapidity of the circulation and the composition of the blood. There are no clinical or experimental data concerning the special influence which increased rapidity of the circulation may exert upon the production of tubercular deposit. But we are entitled to consider that increased rapidity of the circulation does favour its production, because the time of contact between the oxygen and the combustible material is thus diminished (411), and because, as we shall see further on, certain morbid conditions, in which the circulation is notably retarded, have been looked upon as antagonistic to phthisis (419). Circulation.

414 A. The composition of the blood chiefly depends upon the globules, which are the most important part of this fluid. But as yet we know but little with certainty either with regard to their chemical condition, the manner in which they are formed, the part of the system where they arise, or the difference there may be either in their quantity or their composition in the different parts of the circulatory system. One point, however, is well established, viz. that their production in the system is proportionate to the oxydation of assimilative material, that is to say, to the absorption of nutrimentary substances and the reaction upon these substances of the oxygen introduced by respiration. Connection between tuberculosis and anæmia explained.

It has been clearly shown that this oxydation must depend upon the affinity of the oxydizable materials for oxygen; so that whatever diminishes this affinity will decrease in like manner the intensity of the organic reactions, which are necessary for the production of the hæmatoglobuline of the blood. The decrease of the blood globules must therefore be one of the immediate and necessary consequences of phospholigy, because, as has been shown, phosphorus is the most combustible principle in the system (319, 330, 331), and because, according to Rees ('On a Function of the Red Corpuscles of the Blood,' 'Philosophical Magazine,' vol. xxxiii. p. 28), Reich ('Archiv der Pharmacie,' and Liebig and Kopp's Report on 'The Progress of Chemistry for 1849,' p. 366), and Gobley ('Sur les Matières grasses du Sang,' 'Journal de Chimie médicale,' 1851, p. 577), venous blood contains a phosph*ide* element which is oxydized by contact with the oxygen in the lungs, and appears in the arterial blood as the phosph*atic* element. Phospholigy therefore must necessarily be attended with anæmia, and we thus find the explanation of this well-known fact. But, as Andral has very acutely remarked, the anæmia of the consumptive is very different from the anæmia of the chlorotic.

Relation between chlorosis and tuberculosis.

415. Physicians have always noticed the great analogy between chlorosis and tuberculosis; one disease has been frequently mistaken for the other by very eminent practitioners, often to the injury of the patients. Physiological research and clinical experiment have, however, demonstrated the essential difference between these two complaints. Hannover ('De quantitate relativâ et absoluta acidi carbonici ab homine sano et ægroto exhalati,' Copenhagen, 1845, p. 42) found that in phthisis there was a falling off in the quantity of exhaled carbonic acid (341), while in chlorosis there was an increase. Walshe, generally a great despiser of chemistry and chemical research, but a sound, though narrow pathologist ('On

Diseases of the Lungs,' p. 171), says upon this point :—'Confidence appears to be due to the careful experiments of Hannover, showing that the excretion of carbonic acid increases very materially in chlorosis, a new element of confusion of our physiological ideas, for here is precisely the affection in which the ratio of red discs falls lowest.' I will show by-and-bye that this confusion can be cleared up. Therapeutical experiment confirms this result of chemical analysis and shows the difference between these two diseases. Prolonged clinical experience, dating as far back as Sydenham, shows that iron is the specific remedy for chlorosis. It produces a cessation of the whole mass of the symptoms of the complaint, and brings back the blood globules to their normal amount. In tuberculosis, on the contrary, the injudicious use of preparations of iron is very apt to bring on the deposit of tubercle (208). This was long ago pointed out by Brandis and Richter. I myself, as I stated many years ago, have met with several instances of the kind, and the fact has been established beyond doubt by the researches of Trousseau in 1845 ('Des Indications de l'Anémie,' 'Journal de Médecine,' July, and 'Journal des Connaissances medico-chirurgicales,' August, 1845), and still later, of Millet ('Bulletin de Thérapeutique,' June 15, 1862). Walshe ('On Diseases of the Lungs,' London, 1871, p. 454) denies the validity of this opinion. But he refers only to Trousseau, and seems to have been unacquainted with the very striking facts reported by Millet. As I have just said, I have met with instances which place the matter beyond a doubt.

For a long time the existence of poorness of blood, or anæmia, was looked upon as conducive to phthisis. But within the last thirty years many physicians, following the example of Trousseau, have been led to think, that the state of the blood in spanhæmia is antagonistic to the process of tuberculization; at least, in certain cases. Other pathologists have denied the existence of this antagonism, and, no doubt, in many cases also they are right. In this instance, as in so many others which we have already noted, the theory of phospholigy clears up the difficulty. Both in chlorosis and tuberculosis the morbid state appears to depend upon the want of some primordial element, iron or phosphorus, either because the nutriment supplied to the system does not contain it in sufficient quantity, because the organism, owing to some circumstances as yet unknown, does not find it, or does not assimilate it in the proper form, or lastly, because it is consumed more rapidly than it is produced. Now these elements, phosphorus and iron, are both essential parts of the blood corpuscles, so that it is easy to understand, that a decrease of either of these in the system will be followed by a corresponding decrease of the blood globules. But the two elements fill a different office. According to Liebig, the iron of the blood absorbs oxygen in the lungs, and conveys it thence to different parts of the system, gradually yielding it up to the proximate principles with which it comes in contact. On the contrary, the phosphorus of the phosphide element, as we have just seen (414), is according to Rees and Reich immediately oxydized in the lungs, at least, in part, and transformed from a phosph*ide* into a phosph*ate* (257). Now we may suppose that in chlorosis, though the number of blood discs be diminished, their chemical composition remains the same, each of their elements still retaining its normal affinity for oxygen. In that case the organic metamorphoses, which take place during the act of hæmatosis, will be diminished in number, but in the case of each individual blood-disc they will be complete, and the final result will be a diminution in the quantity, but not in the quality of the products resulting from intra-organic oxydation. In phospholigy, as we have seen, this is not so: there, respiratory oxydation must give a difference,

Different function of phosphorus and iron in the blood.

not only in the quantity, but also in the quality of its products. In such a condition, by introducing iron into the system, we increase the number of blood corpuscles, the amount of molecular change, and the number of organic metamorphoses, but, as the quantity of phosphorus is below par, we thereby only aggravate the tendency to tuberculization.

Why Iron is dangerous in phthisis.

Activity of molecular change.

416. This leads to the third point—the influence upon tuberculization of the activity of molecular change (397). Phospholigy, by diminishing the number of blood discs, lowers the rate of general oxydation, and thus also the activity of all the molecular changes. It has been shown that the oxydation of the assimilable material is not fully carried out in the lungs. It is only completed in the ultimate ramifications of the capillary system, when the organic material by a succession of assimilations or integrations, and of eliminations or disintegrations, has passed through the whole series of intermediate combinations, which separates nutrimentary substance from excrementitious products. If the formation of tubercular matter is caused by the organic material becoming so imperfectly oxydized as to be unable to continue its office in the system or to be excreted (340), it follows that the greater the activity of assimilation, the greater the amount of new tissue in process of formation, and the more general the formation of new tissue is throughout the system, so also the more rapid, will be, in cases of phospholigy, the production of tubercular matter, and the more generally will it be disseminated throughout the system.

Accounts for greater frequency of tuberculosis in children.

417. This accounts for the very remarkable fact, of which no explanation has hitherto been given, that tuberculization is much more rapid, and that tubercular matter is much more generally disseminated throughout the system in children than in adults, and in adults than in the aged. (Louis *opere citato*, p. 456; Ancell *opere citato*, p. 363.) In children, as is well known,

the lung is far from being so frequently the exclusive seat of tubercle as in adults, both the intestine and the brain being frequently involved in the disease. But in children, increased molecular activity will, as we have seen, be particularly powerful to produce tuberculization, because, as already said, with them the phosphide element is less in quantity than in after life (271, 389). So that not only do we see why children are more prone to tuberculosis, but also why they are more liable to tuberculization.

And in convalescence after disease.

418. The fact that increased vital activity and the formation of new tissues predispose to tuberculization also explains why it is more likely to occur in the course of or during convalescence after states or diseases attended by exhaustion, such as fever, suppuration, lactation, &c.; during all which there is an increased or abnormal activity of the organism (370—388).

Antagonism of cyanosis and phthisis explained.

419. It is in these variations of molecular change, that we must look for an explanation of the antagonism between the tubercular condition and a series of complaints characterized by cyanosis, or cyanæmia, that is an increase of the venous condition of the blood. This is the case in advanced age, when we know tubercular disease is less frequent and more capable of arrest or of spontaneous cure. We meet with it also in drunkards, in patients with hypertrophy of the heart, in those in whom the foramen ovale remains open, in aneurism of the aorta, in diseases which decrease the capacity of the chest, such as vertebral incurvation, or tumours of the abdomen, also in asthma and emphysema. Now all these morbid conditions have one common characteristic, a decrease of the arterialization of the blood, owing to a diminution of the oxygen introduced into the system, and in all these morbid states, as shown by Rokitanski ('Pathological Anatomy,' London, 1854, vol. i. pp. 316, *et seq.*) and Bouillaud, there is a marked influence antagonistic to the progress or the development of tubercle.

Objection answered.

Here is a new difficulty. My theory of tuberculosis makes it depend upon incomplete oxydation of the organic material, and here we come upon a series of facts showing that the introduction into the system of a smaller amount of oxygen is antagonistic to the disease. This seems a strong objection, but upon examination it will be found that these very facts fit into and confirm the theory. It has been seen that the dark or cyanotic condition of the blood was an index, not of incomplete, but of very complete oxydation, as it is characteristic of venous blood, that is, when the oxygen of the arterial blood has been transformed into carbonic acid (342). It was pointed out that the red colour of venous blood in tuberculosis was a proof of the incomplete combustion of the oxydizable material, and the experiments of Claude Bernard were cited as showing that when a gland or a muscle is at rest, the return blood from it is red, like arterial blood, while if they are in a state of activity or contraction, that is, while oxydation is taking place, the return fluid assumes the dark colour of venous blood (Bernard, 'Leçons sur les Liquides de l'Organisme,' Paris, 1859, t. i. p. 295, *et seq.*) (342). But not only does this dark colour of the blood indicate the completeness of the combustion that has taken place, we shall find that in all the different affections, where this colour is found, there is a co-existence of those conditions, which have been shown to be antagonistic to tuberculization, especially a notable retardment of the circulation of the blood (414). If in these cases the lungs absorb less oxygen, and excrete less carbonic acid, it is not because the blood which is carried back to them from the system is deficient in carbonic acid, as is the case in tuberculosis (341), but because, pulmonary circulation being hampered, the oxydizable material brought in contact with the atmosphere, and the oxygen absorbed by the blood are less in quantity than in the normal state. This is proved by the slowness of organic metamorphosis, and of all the vital actions in the different morbid states, which have just been enumerated. Hence it follows that though the total amount of oxydation and of carbonic acid produced is diminished, the degree of oxydation of the combustible material is complete, or may even be raised, because the quantity of blood coming into the lung is lessened (398), and because, owing to the slowness of the circulation, it is kept longer in contact with the oxygen in the system (411). This new series of facts therefore comes in to confirm what has been already shown, namely, that everything which diminishes the frequency of molecular reaction is antagonistic to tuberculization (397).

Phospholigy = tuberculosis + tuberculization.

420. I have thus endeavoured to show, as far and as clearly as is possible in the present state of our knowledge, that all the chief pathological conditions and relations both of tuberculosis and tuberculization (369) may be referred to one fundamental idea, that of *phospholigy*, or the deficiency in the system of the phosph*ide* element, that is, of oxydizable phosphorus.

This is the first time that anything of this kind has been attempted in medicine.

Phospholigy and ordinary treatment.

421. This same idea of phospholigy, which is the key to the complicated phenomena and relations of tuberculosis will also afford us the means of judging what is the true value to be assigned to certain modes of treatment, to which some importance seems to be attached by popular prejudice, at least, in the absence of positive proof.

Change of air.

422. Change of air has long been in repute as a means against phthisis. But the greater facilities for locomotion which now exist do not appear to have produced any corresponding result upon the mortality of phthisis. We have seen how very scanty are the favourable cases reported by some of those who have had the best opportunities of judging, and who would be more likely to overstate than to understate the results (43). That in

certain states and conditions of phthisis change of climate may have a beneficial influence is undoubtedly true. If the reader will refer to what has been said on the influence of aeration, musculation, and sedentary occupations (382—384, 399), and the effect produced by domestication in animals (394) as favouring tuberculosis or tuberculization, he will understand that any change which enables the patient to breathe purer air, to live out of doors, and to take such exercise as is compatible with his strength, will have a tendency to counteract or to retard the progress of the disease, when once established, perhaps in some rare cases to prevent its development, when there is only a diathetic condition. But this is all that can be expected.

423. The following facts may be looked upon as embodying what is really ascertained with regard to the influence of climate on phthisis. The subject is very complicated, the data very insufficient and unsatisfactory, because usually furnished either by interested parties or by superficial observers, who have had but passing experience (43). A number of elements, which it would be necessary to distinguish, have been mixed up together through ignorance or design, so that it is much more difficult to arrive at a satisfactory conclusion than the public, or even the medical profession, seem to think. Before we could come to any decision as to the hygienic influence of any climate, we should require to be in possession of the following data: 1. The mean temperature of the place. 2. The extremes of temperature. 3. The range of thermometric variations, and the time within which these variations take place. 4. The frequency with which they occur. 5. The period of the year and of the day when they happen. The same requisites would be necessary for the hygrometric condition of the atmosphere, for the barometric oscillations, for the intensity and directions of the wind, and even for electrical and photometric variations. To that it would be necessary to Climate.

[illegible] examination of the geological and botanical state of the country, the social and hygienic conditions of the native population, as well as those in which strangers are placed on their arrival in the country; and it is only after having discovered and determined the share of influence which ought to be attributed to all these conditions that we should be justified in drawing any inference as to the effect of the climate itself. Nothing of this kind has yet been done. Even for places which have long been the resort of consumptives most of the opinions hitherto published on the influence of climate on tuberculosis are, like almost all medical observations, founded upon undefined statements, neither the limits nor the conditions of which have been determined. Medicine for the future must be established upon a basis of definite and ascertained results depending upon definite and ascertained conditions, otherwise it will remain what it has as yet always been, a heterogeneous jumble of conflicting personal opinions, and not a positive science.

The following are the main conclusions at which I have arrived after considerable study and personal experience.

No climate free from consumption. 424. It has not hitherto been proved that there is any climate where tubercular disease is unknown among the natives, or where strangers will remain free from the complaint. This immunity from tuberculosis has been claimed in turn for almost every country under the sun. As our means of travel increase, the fabled land which is supposed to enjoy this privilege, like the mirage of the desert, keeps receding from our view. One hundred years ago, before steam and electricity had spanned the earth, people hoped to find it at Torquay and the Isle of Wight; afterwards it was sought for in the South of Europe, in the Mediterranean Isles, then in Egypt or Algiers, or Madeira. Americans long thought to find it in the West Indies, and now people will not stop until they reach the table-land of the Andes or Polynesia or Australia.

All these opinions were founded upon mere conjecture, or upon insufficient data, or else were put forward by parties interested in propagating the opinion they advocated. In no single instance have they hitherto been found to hold good when subjected to the scrutiny of scientific investigation. Take the following instances:

425. Schnepp ('Du Climat de l'Egypte et de sa Nature dans les Affections de Poitrine comme Station hivernale') states that both modern statistical and historical research concur in showing that consumption has always been frequent among the natives of Egypt. **Warm countries. Egypt.**

426. Green and Goodeve have shown that consumption prevails extensively in every part of India (Webb's 'Pathologia Indica'). **India.**

427. Chisholm states that consumption is very frequent in the West Indies (Clarke 'On Consumption'); and Tulloch has shown from official reports that the British troops stationed there are more subject to the disease than when at home. **West Indies.**

428. I can assert from my own personal knowledge that it is at least as prevalent in Cuba and in Central America, both North and South, as it is in Europe. **Cuba, Central America.**

429. In Brazil the proportion of deaths from consumption is, according to Schnepp ('Comptes rendus,' 1865), as high as one-fifth of the whole deaths. **Brazil.**

430. The same might be shown of nearly every place either formerly or now supposed to be free from consumption, such as Algiers, Malta, Corsica, the Riviera, and the other wintering-places on the Mediterranean, Canada, the western and southern parts of the United States, such as Minnesota, Florida, &c. The temperature of the climate has therefore no preventive influence upon consumption. **Algiers, Malta, Corsica, the Riviera, Canada, United States.**

Sea air.

431. The purity of the air, its dryness or moisture, its impregnation with certain substances, such as the salts of the ocean, have also been held to have a favourable effect in the prevention of consumption; and from the earliest times invalids have been sent to sea with delusive expectations that consumption was less prevalent there than on shore. Rochard ('Influence de la Navigation et des Pays chauds sur la Marche de la Phthisie,' 1856), in a valuable paper which received the prize from the Academy of Medicine in Paris, has conclusively shown that the influence attributed to sea-air and sea-voyages was delusive, the number of deaths due to consumption among the marines of the French navy being more than double that among the land troops.

Altitude.

Table-lands, Mexico.

432. Of late several French physicians have attributed a favourable influence to altitude, but this climatic element seems really to have no more effect than the two we have just examined. It has been repeatedly asserted that the table-lands of India and South America were free from consumption, and the *tierra templada* of Mexico (the temperate part of the country), was instanced as a remarkable case in point. The researches of the French Medical Commission in Mexico, during the last expedition there, show that this is a mistake ('Gazette Hebdomadaire').

Any further number of detailed statements might be quoted in support of what precedes. The following, which refer to some of the most notable places for invalids, will be sufficient to establish the general principle laid down, namely, that *no climate is free from consumption.*

Malta.

433. Major Tulloch (Paper before Statistical Society, vol. iv. p. 1, 1849), after speaking of the prevalence of consumption in the British naval and military forces in the Mediterranean, says: 'While the faculty in this country are sending their consumptive patients to Malta, the

medical officers in that island are sending soldiers labouring under the same disease to England.'

434. The following with reference to the effect of the climate of Madeira is from the *Times* of July 28, 1866:— **Madeira.**

'According to the Report of the Medical Committee of the Consumption Hospital, Brompton, the effect of the climate of Madeira upon the twenty patients who were sent out by this charity in November last to winter in that island, may be briefly summed up as follows:—Five of the invalids left England in the first stage of the disease, four in the second, and eleven in the third stage. As regards their general health, two out of the twenty returned much improved, seven were slightly improved, four were not so well, and one died suddenly in Madeira from rupture of a blood-vessel (in April), though he had done well up to a certain point. In two cases the chest symptoms improved, in twelve they remained stationary, and in five they appeared to have advanced. Four patients increased in weight during their absence, thirteen lost weight, and two experienced no change in this respect. The committee of management do not consider that the result of the patients' residence in Madeira is sufficiently encouraging to justify them at present in repeating the experiment.'

435. About fourteen years ago, and shortly after the publication of my discovery, Mentone suddenly came into great repute as a wintering place for the consumptive. This was originated by Dr. Henry Bennet, the scientific value of whose opinion the reader will know by referring to the next chapter (491). Since then Dr. Bottini has given a sincerer and more reliable account of what may be expected from a resort to this place. He states that out of 250 patients, whom he treated for consumption at Mentone in the course of eight years, 112 were in the first stage, 72 in the second, and 66 in the third. Of the 112 cases in the *first* stage, the course of the disease was stayed in 62, in such manner **Mentone.**

as to *give hope* of recovery, but in the remaining 50 the disease continued its course unchecked (61, 62). Of the 72 patients in the *second* stage, 16 gained strength and flesh, so as to give serious hope of recovery. In the 56 others the disease continued to its fatal termination (63). The 56 who had already reached the third stage of the complaint *all* fell, sooner or later, victims to the disease, although several, under the influence of the climate, had experienced an amount of relief which excited hopes of a cure, and which evidently contributed to prolong their days (64). (Brown, 'Wintering at Mentone.')

Amélie-les-Bains; French official reports.

436. Dr. Champouillon, first class physician in the French army, gives the following summary of the reports sent each year to the Minister of War of the results in the treatment of phthisis at Amélie-les-Bains among the consumptives belonging to the French army and navy. The summary embraces a great number of years, and was embodied in an official report issued by the French Government. The cases of phthisis in the first stage were 3,130. Of these *sixteen* were considered cured, 1,108 improved, 1,482 stationary, 310 worse, and 214 died (60, 61, 62). The cases of phthisis in the second stage are set down as 1,719 treated, only *three* cured, 416 improved, 1,100 stationary, 92 worse, and 108 died (63). The cases in the third stage are 421 treated, *five* cured, 176 improved, 110 stationary, 44 worse, and 86 died (64). ('Gazette Hebdomadaire de Médecine et de Chirurgie,' March 25, 1870.)

The reader will do well to compare the results reported in this and the preceding paragraph with those obtained by the use of the hypophosphites (61—63, 151).

Australia.

437. Australia was a few years ago much vaunted as a resort for consumptives. This originated in the following manner. In 1863 Dr. Bird, who had lately gone out there from England, published a book in London entitled 'The Australian Climates and their Influence on

Consumption.' It deals merely in such general assertions as may be safely used, without any previous and precise investigation, concerning any warm climate whatever (440 A), and excited little attention. When, however, in 1867, the 'Lancet' (January 5) published the detailed results observed by Dr. Bird in fifty cases, many of whom were cured or greatly improved by going to Australia, the impression made upon the public mind was very great. Consumptives, either of their own accord, or by the advice of their medical directors, again, as they have so often done, rushed after the *ignis fatuus* of a climate free from consumption (43, 220, 424). In vain did the 'Lancet' itself, in an article published two years later (September 1869), point out that according to the reports of the Deputy Inspector-General, Dr. Gibbs, more than one half the soldiers invalided in Australia were suffering from consumption. 'The fact,' it said, 'nevertheless, remained, that Australia is frequently recommended in consumption and the advice has often proved to have been very good.' Consumptives still continued to go there until in the following year (1870) the death of Mr. E. Denison, a member of the House of Commons, who had gone to Australia in the hope of arresting his malady, drew the attention of the educated portion of the public in Australia to the custom of sending consumptive patients thither. The local papers and the members of the medical profession protested against a practice which, as they said, '*sends a patient across the world* only to hasten the progress of the disease and the speedy arrival of his death.' The local papers stated that almost every consumptive who goes there dies, that the death rate in Victoria from phthisis is the same as that of England, while the death-rate of the city of Melbourne from that disease is even higher than the death-rate of London. In the Melbourne hospital the deaths from consumption number from 40 to 50 per cent. of the total deaths from all causes. ('Lancet,' April 16, 1870, June 10, 1871.) Other and later reports have still further confirmed these results. ('Lancet,' September 24, 1870, September 27, 1873.) How was this to be accounted for? Simply by the fact that Dr. Bird had given his patients the hypophosphites. The proof of this lies in his own statement, as the reader may see by referring to his cases in Appendix III. (532). It is true Dr. Bird lays no stress upon this. He merely speaks of them incidentally, just as he does of cod-liver oil, setons, &c.; neither does he say whether or not they were taken by all his patients; he says the climate did it all. The fact nevertheless remains, that Dr. Bird's patients who had the climate *and the hypophosphites*, showed an unusual and unexpected number of cures or improvements, while it became a matter of public notoriety in Australia that the others, who got nothing but the climate, found they had undertaken a tedious voyage across the world only to hasten their death. This is not the only case in which public opinion, and worse still, invalids (440), have been thus misled by being told *half the truth*, as will be seen again further on in the case of Mentone (491).

Savagery.

438. If in some few cases it is shown that there really is a difference in the frequency of tuberculosis between one population and another, we must remember what has been stated with regard to the causes which produce tuberculosis, and then we shall understand how unscientific it must be to compare the frequency of consumption among an agricultural, nomadic or semi-savage population with its frequency among the sedentary inhabitants of our large cities. In every case where a collection of individuals is found to be really less liable to phthisis, I have no doubt it will be discovered that the immunity depends more upon such causes as race, temperament, mode of life, food, etc., than upon any climatic influence, which fact is evidently a

secondary and indirect proof in favour of the theory of phospholigy (378, 392).

Dryness of climate.

439. In the present state of climatal hygiene the influence of climate on the production of the *tubercular diathesis* (378) has not been scientifically established. But I do not intend to assert that it has no effect upon *tuberculization* (396). The two great modifying conditions of climate, temperature and moisture, have undoubtedly considerable influence upon the development of tubercle, which is favoured by moisture, and by sudden and great variations of temperature. Dryness of climate and uniformity of temperature are therefore the conditions least favourable to the development of phthisis among those who are not already attacked by it (408 c—410).

Hypophosphites a new cause of uncertainty.

440. The effect of climate upon foreigners, who are already suffering from consumption (424), is established upon data still less accurate than its action in preventing or in furthering tuberculosis among natives. One of the chief reasons of this uncertainty is, as I have repeatedly said, the acceptation, as medical facts, of purely personal assertions, the conditions and limits of which are left undetermined. These are generally based upon a few isolated cases, which are selected and reported, while the unfavourable ones, though far more numerous, are carefully ignored or kept back. Too frequently the observers are hasty, inattentive, prejudiced, or interested. Within the last ten years a new and very great element of uncertainty upon this point has been introduced by the general use of the hypophosphites. I am constantly meeting with patients showing the signs of arrested or cured phthisis, who attribute this result to some particular climate, but who, I find on investigating the matter, have in reality been taking the hypophosphites, and, a very powerful curative influence has been claimed for certain climates by some physicians, which in reality was due

to the use of the hypophosphites. Australia and Mentone are two very striking cases in point (435, 437, 491). A few months ago I examined a young nobleman who attributed his recovery to Cairo, but who, on thinking over the matter, in consequence of my inquiries, recollected that he had taken while there my hypophosphites, prepared by Swann, of Paris. I could multiply instances like this. But unfortunately I also meet with many others, who, upon the faith of such statements as Dr. Bird's, compass sea and land in a vain search after health, which they might have found, if they had applied in time, almost at their own doors. I saw, a short time back, a young Scotch gentleman, who had been sent to Australia for consumption, took the hypophosphites there, and got well. Some years after he returned home, and fell ill again (198), but as his former recovery was supposed to be owing to change of climate alone he got no hypophosphites, was again sent abroad, got worse and died. Another patient was sent by the American trans-continental railroad to New Zealand, which seems now about to take the place of Australia and for the same reasons (437), but as nobody there prescribed the hypophosphites he derived no benefit whatever from the voyage, and came home only to die. Instances of these two kinds are to be met with daily (220).

Climate only influences secondary conditions.

440 A. The favourable action of climatal conditions upon those who are already suffering from tuberculosis appears to be limited to the following effects. Climate may sometimes though seldom prevent the development of tubercles in diathetic patients who are still free from them. But in most cases, when this effect takes place, it is due less to climate than to a complete change of hygienic conditions. Sometimes, though still more seldom, in patients already suffering from phthisis, climate may bring about the disappearance of complications, of secondary

accidents, above all those of an inflammatory nature, and thus prolong for a time the existence of the patient (15, 17, 24). Too frequently, however, the reverse takes place, and a sudden change of climate hastens the evolution and degenerescence of the tubercular deposit. I myself have had considerable experience as to the influence of warm climates in consumption. I have practised for seven years in the tropics either on the extreme limit of the torrid zone, 22° North, in its middle region, 7° North, or in its centre, 2° South; and, as I stated many years ago, the conclusions I then arrived at are that warm countries are favourable to the prolongation of life in the consumptive when the disease has already assumed a chronic form, or in the few and exceptional cases where an arrest of the diathesis has taken place. Warm climates, on the other hand, always aggravate the acute form of the disease, whether this depends upon quick deposit of tubercular matter or upon its rapid disintegration (65, 66). Even when the result is favourable, however, it is so uncertain and irregular that its efficacy cannot for a moment be compared with that of a specific remedy, by which the diathesis, that is, the essential condition itself of the disease, may be eliminated.

My own experience of tropical climate.

441. Among several thousand consumptive patients whom I have had under my care, and have treated by the hypophosphites in the climate of Paris or of London for the last seventeen years, I have never lost *one* of those who, at the beginning of the treatment, were in the pathological conditions of *certain curability*, previously indicated (59, 60, 61, 165). Among those who were in a condition of *probable curability*, I have had very few fatal results, even during severe winters, where the patients were so circumstanced as to be able to avoid all causes of accidental complications. Of the patients who have thus been restored to health, in spite of the un-

Specific independent of climate.

favourable influences of climate, many had before vainly sought for relief in almost every country recommended as useful to the consumptive: the shores of the Mediterranean, Egypt, Madeira, Syria, the West Indies, tropical America, and Polynesia. Since their recovery some of these patients have continued in perfect health in very northern latitudes, such as the north of the United States, Russia, and Canada; on the other hand, I am constantly seeing cases terminate fatally when patients have given up the phosphide treatment, and have trusted solely to the influence of climate, and also among others, who have preferred to rely on such influence combined with the irrational, unscientific or empirical use of the hypophosphites, rather than face the supposed dangers of a northern climate, with the scientific administration of the specific. It is good there should be no illusion upon this point. The hypophosphites are the specific remedy of phthisis, and will cure it in all cases where the local disease is not already too far advanced (165), provided they be given according to the positive and very definite conditions which I have indicated (191). Beyond this consumptives and their friends must expect to meet with nothing but disappointment and disaster.

Stœchiological inhalants.

442. When, besides the hypophosphites, the patient is able to make use of the stœchiological inhalants, the prospects of recovery are more than doubled. In all cases of already existing extensive lung disease the use of the inhalants constitutes as great an improvement upon that of the hypophosphites alone as these do upon the ordinary means. Whatever amount of lung tissue is not already anatomically disorganized may, even in London, during the winter, be preserved and restored to its physiological condition, provided the patient be only able and willing to take proper care of himself. This assertion will no doubt be received with the same amount of incredulity and vituperation as my announcement of the discovery of

the specific action of the hypophosphites. But if I could flatter myself with being right then, in opposition to the experience of centuries, and the universal opinion of the medical profession, I do not feel the slightest misgiving as to my being so now, in this second instance (449).

Climate not to be compared to stœchiological specifics.

442 A. From the whole of the preceding facts it results that, whether the patient does or does not use the hypophosphites, climate is of far less importance to him than the enjoyment of such social and hygienic conditions as enable him to avoid every cause of waste and fatigue, and, above all, any special fatigue of the lungs. But I should consider I was failing in my duty if I did not expressly and positively declare that, in my opinion, all conditions of climate and hygiene are of secondary value as compared with a scientific use of the hypophosphites, united to that of the inhalants, whenever the patient's circumstances will by any means allow of it (506).

Real utility of climate.

When the lungs are cicatrized.

443. To my own patients I only advise change of climate in two cases. I prescribe it after the diathesis has been eliminated, whenever there has been serious local lesion and there are extensive cicatricial surfaces, which will require a considerable time to attain all the degree of improvement of which they are capable. We have seen (192, 194, 200) that this may sometimes demand several years. Under such circumstances the advantages of residence in a southern climate are that the patient can enjoy more exercise in the open air than he could do at home, and is less exposed to intercurrent or accidental pulmonary inflammation.

Not otherwise.

443 A. As long as the diathesis has not been removed, and, above all, as long as the local lesions are not completely cicatrized, or so nearly cicatrized as to make that result almost certain, I do not hesitate to keep the patients in Paris or London for one or two successive winters, especially if they are making use of the inhalants. The results obtained at my public dispensary, Rue Larrey,

Paris, in the treatment of several thousand cases, extending over more than twelve years, among poor patients in the most unfavourable social and hygienic conditions, fully justify this mode of action.

Except in hopeless cases.

443 B. When the patient is in such a condition as to leave no hope of eventual recovery, when he is anxious to go abroad, and his general strength will still allow of his doing so, after having explained either to himself, or better, to his friends, the real state of the case, I do not consider it incumbent on me formally to oppose his desires. Life, even in this last stage, will often be more pleasant in the sunny climate of the south than in our atmosphere of fog or smoke; and as, fortunately, hope never forsakes the human breast, especially that of the consumptive, the change will, at least, serve to prolong his delusions and soften his end.

Theory of phospholigy and ordinary treatment.

444. This is a fitting place to enquire into the bearings which the ordinary modes of treatment may have on my theory of phospholigy.

Cod-liver oil.

An opinion has already been given as to the action of cod-liver oil, but it is advisable to go rather more minutely into the subject. We shall find that it is of some importance, as connected with the theory of phospholigy.

Its effects as shown by C. J. B. Williams.

This substance, no doubt, possesses a certain amount of action against phthisis. It occasionally delays the progress of the complaint. In some few cases it may appear to effect a cure, but these are so few in number that they do not exceed the proportion of accidental recoveries occurring under any mode of treatment, or without any treatment at all (chapter II.). This fact, which had unfortunately become but too apparent to general experience, has been fully established upon extensive statistical data by Dr. C. J. B. Williams, to whom, after Professor Hughes Bennet, of Edinburgh, is due the introduction of this mode of treatment into Great Britain. Dr. Williams deserves great credit for the frankness with which he has laid his failures before the world, and their cause. I wish I could say that since then he had been equally candid in giving the reasons for his subsequent and unexpected successes, of which I shall say more in the next chapter (489). The following is the statement made by Dr. Williams. Although it has already been given in chapter II. (42), it is of such great importance that I think it necessary to repeat it here.

'I have notes,' says Dr. Williams, 'of *seven thousand cases* of phthisis, and I find the average duration of life under the disease has been four years; they have terminated in the immense majority of cases in death. The experience of Louis and Laennec gave an average duration of two years; so that *by the introduction of cod-liver oil and other agencies* we have lengthened the period and doubled its duration. What further? This is only a minor success—a prolongation of life. Can we claim success—a cure? It is doubtful; I can hardly say. I have notes of patients who, having presented the usual unequivocal signs of phthisis, have lived afterwards from two to eighteen years in comparatively good health; but it were hard to say whether they were perfectly cured. Phthisis is a constitutional disease, and it is hard to change the constitutional character. I have notes in this period of only twenty-four cases to which the word "cured" could be applied. They have gone on from two to eighteen years in fair health, and filling their places as useful members of society.

'Of partial cure, cases in which the duration of life has been prolonged beyond the average of four years to a longer period, I have thirty-one cases of prolongation from six to thirty-one years. They have passed these years in a considerable degree of comfort, and with the ability of fulfilling their social duties and partaking in rational pleasures. These persons are now living; their life has been rendered useful and comfortable, and they may yet live for many years.

'I have another set of cases in which, although *death has followed in almost, if not quite all, of them*, life was prolonged to a considerable extent. There are twenty cases in which it was extended from six to sixteen years.

'These three classes make up *in all seventy-five cases*. These are all the successes of which I can boast.' (Dr. C. J. B. Williams' Lumleian Lectures on 'Failure and Success in Medicine.' The 'Lancet,' April, 1862.)

It is difficult to understand how a statement of this kind, publicly made before the College of Physicians by a man of Dr. Williams' eminence in the profession, and which, as far as I know, has not yet been once contradicted or even qualified in a period of twelve years, should have had so little influence upon medical practice, and how physicians still go on twaddling about the curative action of cod-liver oil, give it in every case, and have the audacity to compare the results it produces with those effected by the use of the hypophosphites. It is still more difficult to understand how men who have any pretensions to science can prate (Chambers on the 'Mode of Treating Pulmonary Consumption,' 'Medical Circular,' June, 1862) about the efficacy of such a mode of treatment, and of its *rational* use, unless the rational way to do a thing means not doing it at all. Nevertheless, although it is impossible to find that cod-liver oil has any *curative* action in tuberculosis, Dr. Williams is undoubtedly justified in saying that it does influence the progress of the complaint. It delays the evolution of tubercle, it prolongs, as he has shown, for one or two years the life of the patients; longer still in some exceptional cases.

Merely a palliative.

Several explanations have been offered of this mode of action.

Explanation of its

444 A. Some have attributed it to the fact that some

mode of action.

kinds of oil extracted from the livers of certain fish, such as the cod and the skate, contain very small quantities of iodine and phosphorus; others, again, have supposed it was owing to the presence of some of the materials of the bile. But these opinions are refuted by the following facts. There is no apparent difference in the mode and action of oils which contain these different ingredients and of those which do not. Clinical observation, as established by Theophilus Thomson, Edward Smith, and others, shows that the same therapeutical effect follows upon the use of other kinds of oil than those derived from fishes, such, for instance, as oil of sweet-almonds, cocoa-nut oil, or of any assimilable kind of fat, such as butter, suet, etc.

Theophilus Thomson. E. Smith.

Hughes Bennet's theory of cell-formation.

444 B. Another theory, that of John Hughes Bennet, is more scientific in appearance, but rests on no more solid foundation. Dr. Hughes Bennet starts from a fact supposed to have been established, by microscopical observation that the primitive cell consists of a fatty and albuminoid nucleus. Connecting this with an experiment by Ascherson (Müller's 'Archiv,' 1840, p. 44), who found that when oil is shaken up with a solution of albumen, it breaks up into globules containing the two elements, Dr. Hughes Bennet concluded that tuberculosis was caused by the want of fatty assimilation. Thus the system was deficient in the fatty material necessary to constitute the nucleus of new cells. This explained the symptom of emaciation so prominent in phthisis. The same theory has since been taken up by Dr. Dobell, who attributes the tubercular diathesis to the inability of the intestine to emulsionate fatty matters, which he obviates by the use of his pancreatic emulsion. This theory is controverted by the following facts. Daily experience shows that emaciation in the consumptive does not precede, but accompanies or follows, the establishment of the diathesis. It is, therefore, not a condition, but a consequence of the

Pancreatic emulsion. Dr. Dobell.

diathetic state. In many cases, particularly in adults, it only begins, when local disease of the lungs is already fully established. Ascherson's experimental result is not at all limited, as was supposed, to vital or organic matters, but depends upon purely physical conditions, and may equally take place in many other mixtures, such as metallic mercury and albumen, chloroform and albumen, chloroform and chondrine. I have been able, as I stated long ago, to obtain the same result with a mixture composed exclusively of inorganic materials, such as certain salts of mercury and arsenic. Above all, later microscopical research ('Micrographic Dictionary,' by Griffiths and Henfrey, London, 1860, p. 125) has shown that the cytoblast or nucleus of new cells *does not* consist of fat.

Another theory.

Oils and alcohol check the oxydation of the phosphide element.

444 c. The action of cod-liver oil, and of oils in general, against phthisis depends more probably upon the same mode of action as alcohol. Alcohol is often employed, particularly in the United States, for the same object as cod-liver oil, and with similar results—that of merely retarding the progress of the complaint. The antagonism between drunkenness and tuberculosis (360) has already been pointed out. Fats, oils, alcoholic liquors, and in general all assimilable hydro-carbides constitute what has been called by Liebig the class of respiratory nutriments, the effect of which is to diminish the waste of the organic material by retarding metamorphosis, as is proved by the decrease of excreted urea and the accumulation of fatty substances, either in the liver or other organs (Beneke 'Physiologie und Pathologie des Phosphorsauren und Oxalsauren Kalkes,' Gottingue, 1850, p. 91). But, independently of this well recognized result, they seem to have a more special mode of action, which has hitherto been but little noticed. Certain physiological phenomena and some curious pathological facts observed in the habitually inebriate seem to show that

the use of the hydro-carbides arrests or diminishes the oxydation of the phosphide element, so that they would thus produce indirectly what is effected directly by the use of the hypophosphites. The hydro-carbides might thus in the phospholigic impede the aggravation of the diathesis by diminishing the waste of the phosphide element, but without increasing its quantity, filling up the void, and re-establishing equilibrium in the system. The following facts support these views.

Proofs. Chemical Analysis.

444 D. Bence Jones, as already seen, discovered that there was a diminution of the phosphates excreted by the urine in delirium tremens, that is, in mania caused by drunkenness (Bence Jones on 'Animal Chemistry, London, 1850, p. 87), while Sutherland ('Medico-Chirurgical Transactions,' vol. xxxviii.) showed that, on the contrary, in the delirium of ordinary mania the excretion of the phosphates was considerably increased during the period of cerebral excitement. Prout found experimentally what has since been confirmed by Vierordt, that the introduction of hydro-carbides into the system, diminishes the exhalation of carbonic acid, not only as was supposed by some physiologists, owing to the large proportion of hydrogen they contain, but because they impede normal combustion and the elimination of the oxydizable material contained in the blood. (Carpenter's 'Principles of Human Physiology,' London, 1855, pp. 288, 295). The experiments of Bouchardat and Sandras, as we have seen, also confirm this view (359, 360).

Rare pathological facts. Phosphorescent urine.

444 E. In several cases of phosphorescent urine it has been found that the subjects were habitual drunkards, and the two leading physiologists in England and France, Carpenter (*opere citato*, p. 424) and Milne Edwards ('Leçons sur la Physiologie et l'Anatomie comparée,' Paris, 1863, t. viii. p. 94, note 2), are of opinion that this curious phenomenon is due to the presence in the urine of a phosphide compound owing to imperfect respiration

and oxydation. We have already seen that Ronalds has found by analysis that there is a phosphide element sometimes contained in the colouring matter of the urine.

Spontaneous combustion.

444 F. Franck, in a memoir which received a prize from the medical faculty of Gottingen ('De Combustione Spontanea Humani Corporis,' Gottingen, 1841), has even gone so far as to attribute the extraordinary and somewhat doubtful phenomenon of spontaneous human combustion to the presence in the system of an excess of phosphorized fat produced by the abuse of alcoholic stimulants. (Canstatt's 'Jahresbericht,' 1842, Bd. ii. p. 296). This conclusion of Franck's was founded upon the examination of forty cases.

Phosphide fat in the blood of drunkards.

444 G. Chemical analysis has shown that in some cases there appears to be an excess of phosphide fatty matter in the blood. Zanarelli distinctly asserts this existence of an excess of phosphide fat in the blood of the habitually inebriate. In one case it was so abundant that the blood had assumed a milky aspect, and the substance extracted from it was, says he, exactly *the same as nervous matter extracted from the brain.* Lassaigne found the same white fatty matter in the blood of a she-ass.—Analyse d'un Sang ayant l'Aspect laiteux, dans 'Journal de Chimie,' 1835, t. i. p. 551.

Real value of cod-liver oil.

444 H. These four series of facts all seem to point to the conclusion that whatever benefit may be derived from the use of oils, fats, or other hydro-carbides, is to be attributed to their diminishing waste and oxydation, most probably by interfering with that of its prime initiator in the system, the phosphide element (331, 340). The real value of cod-liver oil, alcohol, and the other hydrocarbides is thus evidently limited simply to retarding the progress of the complaint, partly perhaps by the mode of action just pointed out, but much more generally, in the case of cod-liver oil, by supplying the system with a certain amount of animal nutriment, which would not

or could not be taken under another form. Observation shows that the usefulness of cod-liver oil is in reality confined to two classes of patients. If poor patients who have not had a sufficient supply of animal food nor perhaps of any food at all, daily take a certain amount of it, they will no doubt be benefited, particularly if this be done in a hospital, where they are provided not only with the necessaries, from the want of which they have been suffering, but even with luxuries. This also explains why cod-liver oil is generally found to act much more efficaciously upon the poor than upon the rich. The other class who will be found to derive benefit from cod-liver oil are those dyspeptic consumptives who are averse to animal food, or even to food of any kind. If these are compelled to swallow a certain amount of animal food in the form of oil by the physician's prescription and are able to assimilate it, they will, be benefited to a certain extent. But, as already pointed out, this effect is not confined to cod-liver oil. It may be produced by other oils or fats, such as skate oil, olive oil, suet, cream, butter, etc.

These two conditions embrace nearly all the cases in which cod-liver oil has been of use. This usefulness, however, as we know, is only temporary, and even the short period during which it does last is often put a stop to by the fatigue of the digestive organs.

445. For a considerable time the action of cod-liver oil against phthisis was attributed to the presence of iodine in it, but that iodine itself has any real action against phthisis is very far from being established, as is shown by fifty years' experience. Piorry, who is one of those who has most frequently prescribed it, states, as already mentioned, that out of *several thousand* cases treated by him with iodine in the hospitals of La Pitié and La Charité, in Paris, he had not observed above *a dozen* cases of cure (41). (Piorry sur la Curabilité de la Phthisie, 'Gazette Hebdomadaire,' Oct. 21, 1859). It is, Iodine.

however, undoubtedly useful as an eliminator in certain forms of scrofula.

Metallic salts.

446. The action shown by the hydro-carbides in diminishing the oxydation of the phosphide elements in the system is not confined to this class of chemical compounds. Several metallic salts, such as lead, mercury, arsenic, etc., act in a similar way. It has been said that the workers in these metals are less subject to consumption when suffering from the cachexiæ, to which this kind of work gives rise.

All these act by impairing molecular changes.

446 A. Whatever retards or decreases molecular metamorphosis will tend to diminish in the phosphologic the proneness to tuberculization (416), and on the other hand, whatever decreases the oxydation of the phosphide element will be antagonistic to tuberculosis (360). Oils, alcohols, fats, hydro-carbides, and metallic salts therefore act somewhat in the same manner by impeding molecular reaction and oxydation, and thus diminishing the waste of the phosphide element. But it is easily understood that this result will not be constant, that is to say, specific, because phospholigy may depend not only upon the excessive waste of the phosphide element, but also upon its not being produced or not being introduced into the system in sufficient quantity, as we have seen may happen in the case of the herbivora (356). Hence also we see how irrational it is to prescribe, as is done by some practitioners, along with the hypophosphites cod-liver oil, alcoholic stimulants, or metallic salts. This compromise between two opposite principles is, no doubt, a legitimate proceeding in a branch of knowledge which is in the speculative or embryo state, such as morals or politics, but is altogether out of place in a strictly scientific process, which now perhaps for the first time is shown to be possible in medicine. To administer at the same time one substance which promotes molecular oxydation, and another which impairs it, would, as already said, be even

Scientific objection to joint use of the hypophosphites and oils, etc.

less sensible than coupling together a steam locomotive and a jackass—they, at least, might not pull in opposite directions. (209—211).

Summary of argument.

447. The ideas set forth in this chapter may be summed up as follows:—

I. The animal system contains as an essential constituent of the brain and nervous substance, of the blood discs, of the muscles, of the albuminoid compounds, of the spermatozoa, of the egg, in a word, of the most important parts of the organism, a phosph*ide* element which has not yet been completely analyzed or isolated as a chemical compound, which has been called by many different names, but which, since my researches upon the subject, is now clearly recognized as distinct from the phosph*atic* element.

II. The essential characteristic of this phosphide element is that the phosphorus is contained in it in a state of molecular combination with the other chemical principles, and *is not* yet completely oxydized, while in the phosphatic element (such as the phosphate of lime in the bones) it *is* completely oxydized.

III. This phosphide element is of all the materials of the system the one which has the greatest affinity for oxygen, and seems to be, in animals, one, if not the first, of the primordial initiators of vital activity. Its office is not only to become oxydized itself, but to promote the intra-organic combustion, and hence very likely to initiate the molecular metamorphosis of most of the other proximate animal principles.

IV. The decrease in the system of this phosphide element, either from excessive waste, or from a deficiency in its reintegration, constitutes a distinct and special morbid condition of the whole system, which I call *phospholigy*.

V. This pathological condition leads to a decrease of oxydation, consequently, of all organic metamorphosis, and of all vital action, and is characterized by the whole series of symptoms which precede or accompany a numerous class of diseases, and which have vaguely been called 'deficient or lowered vitality.'

VI. When this decrease of the phosphide element attains a certain degree of intensity, the oxydizability of certain compounds in the system is so much diminished, that they become incapable of sufficient combustion, either to proceed to a higher state of vitality or to go through that process of disintegration which would lead to their excretion from the system.

VII. Under such circumstances these compounds constitute an abnormal material, consisting of incompletely developed bioplasm or proteic substance, variable in its composition, forming the different pathological deposits known under the name of tubercles, which are the anatomical characteristics of phthisis and scrofula.

VIII. The difference between phthisis and scrofula consists in a different degree of phospholigy. In scrofula the phospholigy is less than in phthisis, so that the exhaustion of the phosphide element in the bioplasm only takes place during a secondary or subsequent phasis of its evolution.

IX. This theory of phospholigy enables us to account for nearly all the phenomena hitherto met with in tubercular disease.

Such are the morbid physiological phenomena in the respiratory, circulatory, urinary, and calorific functions;

The elective preference shown by the tubercular deposit for different systems or organs;

The affinity between tuberculosis, scrofula, spanhæmia, and chlorosis;

The antagonism between tuberculosis and cancer, and between tuberculosis and cyanosis;

The prevalence of tuberculosis in certain classes of animals, and its rarity in others;

The mode of action of the different etiological causes, which promote or produce, and of the different cosmic or organic conditions, which aggravate or interfere with, and retard tuberculosis and tuberculization.

X. Not only does this theory of phospholigy thus account for a large mass of scientific facts which have hitherto remained, many of them comparatively unknown, and all of them unconnected and unexplained, but it points to a new and higher view of pathology, in which most probably the many ills which flesh is heir to, will be referable to a small and definite number of initiatory morbid states, themselves depending upon a modification either in the quantity or the quality of some few of the most essential or primordial proximate principles of the animal system.

XI. This doctrine, which is that of stœchiology, will do for the medicine of the future what the discovery of the law of gravitation has done for astronomy, and will constitute medicine as a positive, that is an experimental and inductive, science of the same order with physics and chemistry. See Chap. X.

CHAPTER IX.

PROFESSIONAL HISTORY OF THE HYPOPHOSPHITES.

Difficulties of invention in medicine.

448. I NOW come to the most disagreeable part of my task, which is to speak of myself. I do not wish to air a grievance. We all have our grievances in this world, and mine, whatever I may think of them, are not worse than other people's. I simply desire to show that, however difficult, in a scientific point of view, any discovery in therapeutics, that is in real practical medicine, may be, the scientific obstacles which it has to overcome are nothing compared with the non-scientific.

Seventeen years ago my pretension to have discovered a specific remedy for Consumption was scouted as utterly preposterous. The imputations of quackery and imposture were among the mildest of those which were directed from all sides against me. ('Thèse sur le Traitement de la Tuberculose soutenue à la Faculté de Paris,' 21 Juin 1861; 'Lancet,' 1858, and Sept. 3, 1864; 'Medical Times,' Dec. 23, 1865.) At present everybody talks of curing phthisis, everybody almost pretends to be able to do so, and the main question at issue between me and my adversaries, is not whether consumption be really curable, but whether it be so in the way and under the conditions I have laid down. I think it will prove of some interest, to show how this idea of the curability of consumption by the hypophosphites has gradually worked its way, from the time when it was looked upon as an utter delusion or an imposture, to the point where it now stands. Of late a tendency to raise a new issue begins to show itself, but only here in England (see Appendix III., 516—547), that is whether Dr. Churchill, in pretending to have discovered that the hypophosphites were the specific remedy for consumption, was really guilty of any discovery at all; and whether everyone might not have made exactly the same discovery, if he had only known how!

> 'The invention all admir'd, and each, how he
> To be the inventor miss'd; so easy it seem'd
> Once found, which yet unfound most would have thought
> Impossible.'
>
> *Paradise Lost*, Book vi. l. 498.

The reader must recollect that Milton is describing the feelings of the inhabitants of the Satanic regions, else it might be thought singular that he makes no mention of any envy excited among them by the discoverer (455).

In what follows, I am sorry to say, I shall be compelled, much against my will, to come into collision with several physicians; for some of whom I have scientifically a very great regard, towards whom personally I entertain not the slightest ill-will, and with whom I shall have to engage in a controversy which I would much rather have passed over in silence. But as my object is to show that the results of my discovery are now unwillingly, reluctantly and grudgingly admitted in England, and that the only difficulty in the way of its being proclaimed upon the house-tops for the benefit of all is the continued existence of my individuality, I shall be obliged to put the necessary witnesses into the box, and to cross-examine them in such a manner as to elicit the truth.

No one who has not had a personal experience of the matter can form any idea of the difficulties which stand in the way of the general admission of such a fact as the discovery of a specific remedy for consumption. Not only are there scientific and technical difficulties, but there are numerous social habits, class prejudices, and personal interests, which are all instinctively banded together against it. I shall endeavour as briefly as possible to show how each of these in turn has been brought to bear against my discovery, and the way in which they have prevented its recognition and its general diffusion.

Social difficulties.

449. The first of these, the social difficulties, are of so general a nature that it might perhaps appear superfluous to speak of them. But history is never so instructive as when teaching by examples, and if there is any hope for an improvement in the public mind upon this point, it can only be by showing how the general conditions of the problem influence each special question. Some years ago a French writer, M. du Hallay, described the difficulties which stand in the way of the propagation of scientific truth ('Revue des Deux Mondes,' t. xiv.) so concisely that I cannot do better than copy his words—'Whenever,' said he, 'an idea ends by victoriously making good its place in the world of intellect, and by endowing mankind with the blessings of its practical results, we invariably meet with the same identical phases of evolution:—*Indifference of public opinion, denial of results, endless delays, garbled experiments, contested importance.* Such is the sequence, which looks like the repetition of a stereotyped formula.'

Class interests opposed to all improvement.

450. This is the ordeal which all discoveries have to go through; but those who are unacquainted with the history of science, and of medical science in particular, are always ready to suppose that among a body of men so highly educated as the medical profession, the lower and baser natures have but little sway, that, in a question of life and death to thousands of the human race, medical judgment would be solely guided by the light of science, and impelled by the love of mankind. I have no wish to cast a stone at the profession. I consider it an honour to belong to it, and

though I cannot pretend that I think it much better, I certainly do not think it any worse, than any other. No class contains a larger proportion of men ready for every sacrifice at the call of duty, and yet none in its collective action has ever been so blindly and malignantly hostile to all progress. It is a notorious fact that in the medical profession every originator of a real improvement has been stigmatized, at the outset, as a quack and an impostor. In fact the great argument made use of by quackery outside of the profession is, that inside of it all new truths have been branded as such. So that just as there are negative and positive quantities in mathematics, there is a positive and a negative quackery in medicine. The first, chiefly met with outside of the profession, asserts what it knows to be false, the second, mostly prevalent inside of it, persistently denies what it knows, or at least suspects to be true. It were hard to say which of these two has done most harm to mankind.

451. The history of medical invention fully bears out these statements. Proofs.

The discovery of the circulation of the blood by Harvey, instead of furthering his professional interests, raised up a host of enemies, and diminished his practice. Hume says, in his 'History of England,' that among Harvey's contemporaries no physician who was above the age of forty at the date of the discovery ever admitted the truth of it. Circulation of the blood. Harvey.

452. Antimony had been known to the ancients, but had been forgotten. In the fifteenth century the use of it was revived by Basil Valentin, a German monk. In 1566, a decree of the Parliament of Paris, issued at the demand of the faculty of medicine, forbade the use of it in France; and in 1609 Paulmier, a professor of this same faculty, was expelled from it for having infringed the decree. As the drug was useful, it continued to be Antimony.

was very near giving the death-blow to vaccination. By-and-by we shall see that the Brompton Hospital for consumption—an institution incorporated by charter, and expressly founded for the purpose of improving the treatment of, and discovering a cure for, phthisis—in experimenting upon the hypophosphites, has faithfully trod in the footsteps of the Small-pox Hospital in the days of Jenner, thus showing that these things are not due to individual caprice or design, but are simply an outcome of human nature. Jenner's enemies left no means untried to excite public opinion against him. The caricatures of the time represented him as an ogre devouring little children. When the public had taken up the matter, when societies of non-professional persons had spread the practice of vaccination throughout the land in spite of the medical class, when Parliament had voted him a reward of £40,000, the London physicians, and at their head the very men who had so carefully experimented at the Small-pox Hospital, also got up a society for the propagation of vaccination. But they would not allow Jenner to be a member of it, even upon his own application, and the College of Physicians considered they would disgrace themselves by admitting him into their body.

Hunter. 457. John Hunter has been placed by good judges, among the great masters of organic science as belonging to the same rank as Aristotle, Harvey, and Bichat, and as somewhat superior to Haller and Cuvier. Of him Buckle says: 'By the aid of animal chemistry Hunter endeavoured to search out the qualities of the blood, so as to ascertain the properties of its constituents. He also examined it in different stages of embryonic life, and by minutely tracking it through its periods of development, he made the capital discovery that the red globules of the blood are formed later than its other components. His contemporaries, however, were so little alive to the importance of this great physiological truth that it fell dead upon them, and, being forgotten, it was, about fifty years afterwards, rediscovered, and was announced in 1832 as a law of nature which had just been brought to light. Hunter, besides making the discovery, also saw its meaning. From it he inferred that the function of the red globules is to minister to the strength of the system rather than to its repair. This is now universally admitted, but it was not admitted till long after his death' (Buckle's 'History of Civilization,' vol. iii. pp. 436, 437). 'As to his merits, it is now admitted that in addition to his physiological discoveries, and the great pathological views which he propounded, we may trace to him nearly all the surgical improvements which were introduced within about forty years after his death. . . . .' 'On general inflammation he threw so much light that the doctrines which he advocated, and which were then ridiculed as whimsical novelties, are now taught in the schools, and have become part of the common traditions of the medical profession. He, moreover, introduced what is probably the most capital improvement in surgery ever effected by a single man, namely, the practice in aneurism of tying the artery at a distance from the seat of the disease. . . . .' 'But so far as his own immediate reputation was concerned, all was in vain. . . . .' 'His English contemporaries were unable to appreciate his comprehensive speculations. In their opinion, he was little else than an innovator and an enthusiast. Even the practical improvements which he introduced were coldly received, because they proceeded from so suspicious a source. . . . . .' 'So little was he regarded by that very profession of which he was the chiefest ornament that during the many years in which he delivered lectures in London on anatomy and on surgery his audience never amounted to twenty persons' (Ibid. vol. iii. p. 454 *et seq.*).

Buckle might have added that the real value of

Hunter's doctrines and teaching can be expressed in four words, 'He was Jenner's master.'

This a natural law.

458. This simple recital shows that when some great discovery is controverted and denied by individuals, to lookers-on they may appear actuated by personal and interested motives, but a deeper insight into the springs of human action shows that they are often unconscious, or only half conscious of any such bias: they feel that they carry with them the sympathies and act as the acknowledged representatives of their class. It would be easy to point out why this is specially the case in the medical profession, and more so in this country than in any other, but that would be foreign to my purpose. I have said this much to show that the opposition, which my discovery has met with, far from being an argument against the reality and the truth of it, as people uninformed upon the matter so often think and say, is, on the contrary, one of the proofs in its favour. The amount of opposition which any truth meets with is in direct proportion to its importance.

My experiences.

459. My discovery of the specific action of the hypophosphites against consumption was made in February, 1855, while I was practising in Havannah. I returned to Europe in May, 1856, and on June 3 in the same year enclosed the principles and outlines of my discovery in a sealed packet, which I deposited with the Academy of Medicine in Paris. The contents of this packet were nearly identical with the paper afterwards read before the Academy of Medicine in Paris in 1857, as given in Chapter III. (48—55). My reason for not publishing my discovery at that time was, that I had only twelve cases in which the remedy had been used, of which six had been followed by recovery, three had improved, and three had died. In such a disease as consumption I thought I should not be justified in bringing forward my claim to a discovery of so much importance supported by so small a number of facts. In Paris, I applied to several of my friends, who were phy-

Trials in the Paris hospitals.

sicians in the French hospitals, and to some of my former masters, in order to obtain their assent to a trial of my new remedy in their wards. Dr. Charles Bernard placed eight patients under my treatment, Dr. Briquet one. My friend and master, Professor Bouillaud, was also willing that I should select patients in his wards, but I soon discovered that the consumptive patients, usually found in the Parisian hospitals, being only admitted when they are confined to their beds, were in too advanced a stage for me to obtain the prompt and decisive results which would force conviction upon the incredulous. The cases will be found reported in my French work. Dr. Charles Bernard therefore agreed that we should select a certain number of patients, whom I might consider to be still in the curable stage at the Bureau Central, where all patients in Paris have to apply before their admission into the hospitals, except in urgent cases. Opposition, however, had been roused, and the very day after Monsieur Bernard and I had selected a certain number of cases, he received an order from the Administration Generale or governing body of the French hospitals, forbidding him to allow any more patients to be treated by me in his wards. (See my work, 'De la Cause immédiate de la Phthisie,' etc., First edition, Paris, Preface, p. 12.) Upon this I came to London and applied to the Governors of the Brompton Hospital, asking them to allow me to treat a certain number of patients at the hospital, under the engagement that my mode of treatment should be made public, as soon as it was acknowledged to be useful, and that in the meantime I would engage in no private practice ('Medical Circular,' 1858). This proposal was rejected, and some attempts which I made for the purpose of getting the question ventilated through the English medical press were so ill received, that I returned to Paris, and on July 21, 1857, read a paper before the Academy of Medicine, with the results I had attained in the treatment of only

Rejection of my proposal to the Brompton Hospital.

Publication of discovery.

thirty-four cases, after having spent more than twelve months in fruitless efforts to obtain even a hearing from the Medical Press or the profession. This publication made considerable noise, both in Europe and America, although the leading English medical journals refused to publish a few lines I sent them containing a summary of my paper. In September, 1857, I published the first edition of my French work, which was sold in less than six months. The idea was in itself so simple, the mode of treatment was apparently so easy in practice, the immediate effects produced by the hypophosphites were often so striking and unexpected that it at once came into considerable use. But in this, as in all other processes, where care and attention are required, the results obtained were very conflicting and contradictory. To most practitioners the pretension to cure consumption appeared so utterly preposterous, that it was only as a kind of salvo to their consciences, and when patients were already almost in a dying condition, that they would try the hypophosphites at all. In such cases the final results were of course *nil*. When, on the contrary, the cases were treated in an early stage, and as frequently happened, not only the general symptoms, but the physical signs themselves rapidly disappeared; men, who were not very practised auscultators and had never seen a case of consumption get well before, simply came to the conclusion that they had made a mistake. They argued that consumption could not get well in that way; that it must have been a case of simple bronchitis, or some other non-diathetic disease of the lungs (10). Thus all cases of ill-success were carefully scored to my account; the successful cases were frequently set aside as suspicious, and the cases where the patients had only improved, without at once getting rid of their physical lesions, were set down as unsatisfactory and inconclusive.

Its immediate effect.

Subsequent opposition.

460. While this was going on among the mass of the

profession in different parts of the world, the professorials, who form of themselves in every country a class within a class, and pretend to a monopoly, not only of the teaching of science, but of science itself, had not been inactive, and soon, one after the other came out with the results of his experience in the *unsuccessful* use of the hypophosphites.

Vigla.

Dr. Vigla of Paris was the first, and in February, 1858 ('Journal de Pharmacie et de Chimie'), he stated that out of twenty patients whom he had treated not one had experienced the slightest improvement; that doses of hypophosphite varying from fifteen to sixty grains daily had produced no effect either good or bad (99). I shall not enter into the details of Dr. Vigla's statement, nor of my reply to it, which will be found in my French work ('De la Cause immédiate de la Phthisie,' Paris, 1864, p. 834); I will simply say that I showed conclusively from Dr. Vigla's own statement, that the salts he used were impure, and contained a quantity of free soda or free lime, as acknowledged by the chemist, who had himself prepared them, and that the remedy was only used when his patients were already in a dying condition.

Reasons for not dwelling upon these negative results.

460 A. I shall say but little of these negative results, of which so much parade was made at the time. All who care to know more about them will find them in full in my French work. The reason why I may now pass them over in silence is obvious. A scientific result when once verified and confirmed by a sufficient amount of independent testimony cannot be invalidated by any number of negative instances, because, although there may be but one way of doing a thing right, there may be a hundred ways of doing it wrong. Negative results, therefore, only show that they have been arrived at under different conditions from those which lead to positive results. At the present day every one of the statements originally made by me concerning the action of the hypophosphites

has now been confirmed by a sufficient amount of independent testimony, to show that they were neither the result of deception nor delusion on my part. Any one who takes the trouble to study the question, will find that there is hardly a single detailed instance of the apparent failure of the hypophosphites that cannot be distinctly traced to neglect or ignorance of some one or more of the conditions which I had shown to be necessary for their successful use. A complex process, such as the cure of a case of consumption in the second or third stage, requires to be carried out with the same care and the same attention to minute details as an experiment in chemistry or physiology, or an operation in surgery. This is so to speak almost a new requirement in therapeutics, and to many physicians appeared so great a novelty that it was quietly ignored or set aside as a pretentious mystification of the same kind as that of having discovered a *specific remedy* for tuberculosis. Since the publication of the second edition of my French work there has been hardly any further controversy as to the fact of the value of the hypophosphites. Of all these negative results I may therefore without any undue presumption say that they are things of the past. The hypophosphites have taken their place in the materia medica of every civilized country, and they will keep it without any further help from me. I shall make but two exceptions to this. In a work for English readers I cannot pass over the reports of the physicians of the Brompton Hospital, Dr. Cotton and Dr. Quain.

Trials at Brompton Hospital.

Cotton

461. In 1858, Dr. Cotton tried the treatment upon twenty patients at the Brompton Hospital, eight of whom showed an improvement within the first fortnight, but said Dr. Cotton, 'this could not be due to the hypophosphites, for when I made these patients leave off the hypophosphites and gave them cod-liver oil or some other remedy, they still continued to improve.' With regard to those who did not

improve within the first fortnight, the hypophosphites were equally left off, Dr. Cotton having decided that that was the limit of time within which the hypophosphites were required to show their specific efficacy against the disease (204). ('Medical Times,' February 13, 1858.)

My answer to Dr. Cotton will be found in the 'Lancet' and in my French work ('De la Cause immédiate de la Phthisie,' etc., Paris, 1864, p. 838).

Since then I have had several controversial encounters with Dr. Cotton, which will be found in the 'Lancet,' 'Medical Times,' and 'British Medical Journal,' *passim*, and have found it very difficult to deal with such an adversary. Dr. Cotton's mode of procedure has been invariably the same as in his first experiment. If any of his patients did not improve within a very limited time, he concluded that *they* proved the inefficacy of the hypophosphites. As for those who did improve, he made them also leave off the treatment: if any among these got worse, that proved the uselessness of the treatment, while if some continued to improve that showed they could do as well without the hypophosphites as with them. This is a novel and altogether unexpected application to science of the wonderful maxim we owe to some deep-thinker, 'heads I win, tails you lose.' Before the practical application made by Dr. Cotton to medicine of this great fundamental principle, I must admit that the hypophosphites 'pale their ineffectual fires.'

Testimony in favour of my discovery. Deforchaux. Santa Maria. Maestre de San-Juan. Parigot. Reinvillier. Galvez and Leriverend.

462. In the month following Dr. Cotton's statement, Dr. Deforchaux gave the account of his experience in the matter, which I have already quoted (171). His paper was followed by favourable reports from Dr. Santa Maria (172), Dr. Maestre de San-Juan (173), Dr. Parigot (174), Dr. Reinvillier (175), Drs. Galvez and Leriverend (176), from which I have already largely quoted.

Quain against.

463. In 1860 Dr. Quain published a letter in the 'Medical Circular' (March 7, 1860), and in the same

month a long article in the 'Lancet.' He stated that he had given the hypophosphites at the dose of 3 drachms ('180 grains,') daily, at the Brompton Hospital, without any more effect than so much chalk or carbonate of soda (99). This was just twelve times the usual maximum doſe which I was then giving, and four times the largest dose I had ever tried experimentally, and which I had found was injurious to the patient. As I pointed out at the time, Dr. Quain's report, showed one of three things, either that he had made up his mind to treat his patients in such a way that they should not get well, or that Dr. Quain, though a Professor at University College, Physician to the Brompton Hospital, Government Representative in the Council of Medical Education, Censor of the College of Physicans, with a host of other titles, is utterly ignorant of the most elementary rules of scientific experiment; or, lastly, that therapeutics, that is to say, the real practice of medicine, are in such an unscientific state, that the practitioner does not even imagine that the attaining of a given result, or the production of any specified phenomenon, can be dependent upon any condition whatever, so that even in the use of a new and untried remedy, the dose or quantity to be given is altogether an indifferent matter. I leave the reader to decide which of these three alternatives is applicable to Dr. Quain. The whole of his statement and my reply thereto will be found in my French work, 'De la Cause immédiate de la Phthisie,' Paris, 1864, p. 884.

Effects of Brompton Reports.

463 A. These reports of Dr. Quain and Dr. Cotton, concluding not only as to the inefficiency of the hypophosphites against consumption, but as to their utter *uselessness as drugs to produce any effect whatever upon the animal system*, made a very great impression, partly on account of the position of the authors, but above all because they were admitted to express the opinions of the whole medical staff of the Brompton Hospital, which had been chartered, founded and munificently kept up

by the public for the express purpose of improving the treatment of consumption.

In spite of the utterly unscientific mode of procedure which was employed, as is evident from their own statement, and as was pointed out by myself, by Dr. Heslop (523), Dr. Vintras (526), and by Mr. Taylor (181 A), in spite of the mass of independent testimony since published in proof of the action of the hypophosphites, in spite of the deliberate opinion of the two leading organs of the medical press, the 'Lancet' and the 'Medical Times,' that Dr. Quain's and Dr. Cotton's experiments were of no value (484, 485), the Brompton Hospital experiments are constantly quoted, not only in conversation but in print, not only by the public but by the profession, as decisive of the question. Owing to the fact of my works being in French, most people in England have never heard of me or of the hypophosphites, but in connexion with these deplorable and delusive reports. Like the false experiments at the Small Pox Hospital upon vaccination (526), these Brompton experiments dealt the hypophosphites a staggering blow, which will be felt for years. The indolent, the ignorant, the malignant, have been too glad to shelter under such a precedent their remissness or their failures. I know not what amount of good this hospital may be the means of doing by the relief of individual cases, but if (as every year's evidence increases the probability of it) the hypophosphites be the specific remedy for phthisis within certain definite and ascertained limits of time, degree and action (515—547), there is no exaggeration in saying that this series of experiments, carried out by two physicians in a corner of London fourteen years ago, will have cost more lives than all the wars that have taken place since the beginning of the present century.

Further confirmative testimony in favour of

464. From 1860 up to 1864 Drs. Heslop (178), Dickson (179), Denobele (180), Feldman and Pfeiffer (181), Mr. Taylor (181A), and Dr. Vintras (182), published the

the hypophosphites. Denobele. Feldman and Pfeiffer. Taylor. Vintras.

different articles from which I have already quoted, and which were all in favour of the treatment.

Second Edition of my French Work.

465. In 1864 I published a second edition of my original work ('De la Cause immédiate de la Phthisie pulmonaire et des Maladies tuberculeuses, et de leur Traitement spécifique par les Hypophosphites d'après les Principes de la Médecine stœchiologique.' Deuxième Édition, Paris, 1864), in which I greatly enlarged the field of view and reported in detail the results obtained by myself or by others in the treatment of 254 cases, with all that had, up to that time, appeared either for or against the treatment. This was a turning point.

The hypophosphites come into general use.

466. From that time until now the use of the hypophosphites has been steadily expanding, as their specific action in phthisis has become better known, and as their general effects upon the system have been found applicable to more numerous forms of disease. A series of compounds which, up to the time I discovered their remedial power in phthisis, were hardly known to most chemists, even by name, which could scarcely have been met with, even as samples, in the largest laboratories, are now, and for the last ten years have been, manufactured by the hundredweight, and at the last Paris Exhibition were displayed by the score of specimens in almost every show of chemicals. The general result, therefore, leaves nothing for me to complain of. The points to which I specially wish to draw attention are these:

But as a drug not as a remedy.

467. Hitherto their administration is not carried out with that degree of scientific precision which I have endeavoured at considerable pains to show is possible, and from which only can we expect to derive the full benefit which will one day flow from my discovery—the extinction of phthisis, so that what I had spent years of labour in settling as a *specific remedy*, based upon *ascertained scientific conditions*, has been used, misused and abused, with the coarsest empiricism, as a *drug* (231, 234).

467 A. Next, although the hypophosphites have thus

fought their way against all opposition, the author of their discovery has hitherto received no recognition of this service, but in this his own country has found it a formidable stumbling-block in his way. Lastly, although they are in general use, they are, so to speak, made a professional secret of by those who use them. As I have said, if this were merely a personal matter I should keep silent upon it now, as I have done for many years. I wish simply to call the reader's attention to the fact, as later on I intend to show that it leads to consequences which are of much less importance to me than to the special class of persons who may care to read through this book.

Scientific difficulties

468. One of the chief reasons why the treatment by the hypophosphites has not met with that scientific recognition on the part of the profession to which it is entitled, nor been applied with the precision of which, as I have shown, it is capable, is that therapeutics, which are the practical part of medicine, and without which all the rest is of no use, are, as I have repeatedly pointed out, hitherto altogether devoid, not only of anything like scientific precision, but even of technical accuracy (484). The practice of medicine is most generally mere blind, aimless, purposeless drugging, to see what may possibly turn up. That this is no overcharged statement is sufficiently proved by the fact that, at an interval of more than half a century, the great mass of the profession in this country, almost without a word of comment or objection, have accepted as legitimate medical (it is impossible to say scientific) conclusions the results arrived at by *unconditioned* experiments in the two different instances of the Small Pox Hospital (456), in the trial of vaccination, and the Brompton Hospital in that of the hypophosphites (461, 463). This is the chief obstacle in the way of the general use of the hypophosphites. Another, and perhaps equally powerful, difficulty is the very low state of chemical knowledge which prevails among medical men. There is not one in ten of those who talk in the most off-handed

manner of the value, or rather of the uselessness, of the hypophosphites, who could explain or knows anything of their chemical composition or properties, and who is not constantly, both in language and practice, confounding them with the phosphates, with which, except in name and in obsolete chemical classification, they have no more analogy than sugar has with vinegar, or morphia with quinine (98). One of the most learned, and at the same time one of the most practical of French pharmacologists, M. Dorvault, expresses himself on this point as strongly as I do myself. 'Officine' (7th ed. p. 169).

Professional difficulties. 469. Independently, however, of those scientific reasons, there are others of a rather less elevated order, though none the less potent on that account. These are of a purely professional kind. It has hitherto been the custom, in this country, for the practitioner of a certain rank to leave such low and vulgar things as drugs and medicines altogether in the hands of the chemist or the general practitioner. It is considered *infra dig.* to propose a new remedy, still more to have anything to do with the sale or the propagation of it. So that the almost constant practice has been for the druggists to propose remedies for diseases of which they know nothing, and for the physicians to treat these diseases with drugs of which they know still less. If the present work has any real foundation, it shows from one end to the other, that of all the acquirements of the physician, chemistry is the most important.

469 A. When I first published my discovery of the therapeutic action of the hypophosphites, I had no intention of not following in the usual track. In a letter which originally appeared in the 'New York Tribune' in 1858, I said: 'In publishing my *specific cure* for consumption, I was well aware of the natural repugnance of the medical profession to adopt any new remedy, particularly when so many had already proved

unavailing; and I knew that nothing could prove a greater obstacle to the general adoption of the means I proposed than the idea that I was actuated in recommending it by a motive of self-interest. I have, therefore, from the very first rejected every proposal to connect myself in any way with, or to derive any pecuniary benefit whatever from, the manufacture or sale of the hypophosphites I have thus renounced all right to a large, and, in the opinion of most people, a legitimate source of profit, because I have always looked upon the discovery of their therapeutic effects as a trust confided to me for the benefit of my fellow-creatures, and which I was bound to administer to the best of my ability, not for my advantage, but for theirs. Whether the course I have thus followed has been the best calculated to hasten their general adoption by the medical profession, time alone can determine. I shall, however, have at least the satisfaction of knowing that from no one sufferer will this great boon have been withheld from any fault or for any benefit of mine' ('On the Prevention of Consumption by the Use of the Hypophosphites,' London, 1859).

Piracy of my name.

469 B. This letter was written because, almost immediately after I had made known the medicinal properties of the hypophosphites, a person in the United States published a piratical translation of my French work, announced himself throughout the length and breadth of the land as my representative, and established agencies in all the leading towns, from which alone, as he stated, my remedy could be procured. This he did without any authorization from me. Although I wrote to several of the leading journals in the States (among others the letter from which I have just quoted) to repudiate any connection with him, a few denials of this kind at rare intervals were overborne by a torrent of advertizing. This honest example has been followed by several imitators. No less than four such have come to my own knowledge, and two

of them at least have been doing so for the last seventeen years. The consequence was, that for more than four years I was overwhelmed with letters enquiring whether this person's assertions were true, and whether his preparations were really approved of by me. In France the same thing was done, and I had to bring an action at law, in which I obtained a decree of the courts against one of the leading chemists in Paris to restrain him from using my name without my leave. This took place from 1858 to 1862, during which time, while the profession in England and America were denouncing me as a quack and a patent medicine vendor, consumptives and individual physicians were overwhelming me with continual complaints of the uselessness of the hypophosphites and of the impurity of the preparations sold under that name (87—93). I have drawers full of such correspondence.

Reasons for establishing *my hypophosphites.*

469 c. After bearing with all this for four years, at last, in order to put a stop to it, as far as lay in my power, I thought it advisable to allow M. Swann of Paris to sell the hypophosphites in the form of syrups under my name and with my signature, as a guarantee of their purity. These syrups are prepared according to the formula I published as the best calculated to secure the perfect purity and constancy of their composition. They are those I always prescribe for my own patients, and I therefore strongly recommend that they should be used in preference to any other, as in so serious a disease as consumption the patient should incur no risk that can possibly be avoided (535). I conceive that in taking this step, far from having acted in any way against the interest or the dignity of the profession, I have simply been fulfilling a duty both towards the public and towards myself.

Imitations and counterfeits.

470. The hypophosphites, however, were doomed, like all discoveries of any value, to fall a prey to that horde of counterfeiters and pirates who are the real plague-spot of all inventive progress. While some have been striving in vain to discover some other preparation of

phosphorus which should, like the hypophosphites, be at once assimilable and oxydizable, the majority have followed the very simple plan of selling the hypophosphites under another name. One man has found a wonderful foreign farina which, as he states, fulfils all the requirements of Dr. Churchill's discovery (of which he gives full details taken *verbatim* from my book) without any of the dangers attending the use of the hypophosphites. This wonderful farina consists of a mixture of maize-flour and hypophosphite. Another has found a quintessence of cod-liver oil, which, as he says, has all the advantages of that well-known drug without any of its disagreeables. This is made up of hypophosphite and sugar of milk. I might give several other instances of the kind.

Pharmaceutical confusion.

470 A. Besides these downright piracies, it would be tedious to enumerate all the more or less useless or dangerous imitations of my discovery which have come into vogue. When first it was published, preparations of the *phosphates* were started in 1858 in opposition to the hypophosphites as a commercial speculation. They were speedily found useless and abandoned, but have lately been again revived in the same manner, and within the last few years we hear of nothing but preparations of phosphorus, which either here or on the continent are now being sold under the name of 'phosphates,' 'biphosphates', 'superphosphates,' or else by some other name. All these are either inert and useless phosphates, or else a mixture of phosphates with more or less hypophosphite, hypophosphorous or phosphorous acid, to which alone is due whatever medicinal virtue they possess. As already explained, this would be a matter of little importance were it not that in so formidable and fatal a disease as phthisis no one is justified in substituting for the accurate and positive process of science the haphazard results of commercial speculation. Among these preparations such as contain an oxydizable phosphorized compound, will, in most instances, produce a certain degree of improvement

Its dangers.

in the patient at first, but this will generally be only of a temporary character, and lead in the end to a fatal result, which might have been avoided under scientific treatment. If the reader will refer to what I have said on this point he will see the reason why (197). The ear of the pharmaceutists and of the public is so fully taken up with the clamour of all these pretenders that in London, my own patients have frequently the greatest difficulty in obtaining from their own druggists my hypophosphites, or any reliable hypophosphite at all.

Instances. I could give many instances of the evil thus done. Some time ago a poor man called upon me for advice. He was a widower, whose wife had died of consumption, leaving him with a family of eight children, all delicate, and all predisposed to the disease. He had heard of me and my discovery, and seeing a lacto-phosphate advertized he had given it to them. The eldest child was then dying, the second almost beyond hope, the others had received no benefit at all. This year one of my own patients, in an advanced condition of the second stage of consumption, after being greatly benefited by the inhalants, was directed to continue the use of the hypophosphites alone. I had prescribed my hypophosphites, prepared by Swann, of Paris. After some time, seeing that, contrary to my expectations, he was losing ground, I examined every circumstance very minutely, and found, after some trouble, that, instead of going to the druggist I had directed my prescription to, he had gone to another, and had all the time been taking a preparation which had been given to him as Swann's, but which was not so. He immediately procured the genuine syrup, and in a few days there was a marked change for the better, which since has become a steady and regular improvement, but this was only found out after a second recourse to the inhalants, without which he would certainly have died (535).

471. What increases the confusion produced by this state of things is the fact that the commercial phosphates may sometimes have a therapeutical action, because, as has been shown by the researches of a number of chemists, among others, of Weigel and Krug, Schmidt and Della Sudda (98, 99, 258, 259, 265, 267), commercial phosphoric acid contains notable quantities of phosphor*ous* acid (98), that is to say, of an oxydizable phosphorized compound (Casper's 'Medicinische Wochenschrift,' 1844, p. 455), and therefore exhibits all the activity and may lead to all the dangerous consequences of the oxydizable acids of phosphorus when in an uncombined state. This is the case with a preparation now sold in this country under the name of 'chemical food,' which is a solution of different phosphates in an excess of phosphoric acid. Its use should therefore be carefully avoided, at least in phthisis, on account of the double danger arising from its containing a salt of iron (109, 208) and free phosphorous acid (108). **Its dangers.**

These practices are not confined to England; the Belgian medical journal, 'Le Scalpel,' in its number of the 8th of June, 1873, says, 'The value of the hypophosphites in consumption is now so well established that it has created a great number of imitations, which, in general, are nothing but phosphates of different kinds.' It might have added, 'or of hypophosphites in disguise.'

472. I will not take upon me to say that all these attempts have been made with a pecuniary object alone, but, when they have not, it has been in complete ignorance of the researches and experiments I have made upon the subject, and which were published in the second edition of my work ('De la Cause immédiate de la Phthisie,' etc. Paris, 1864, p. 679). As early as that time I had foretold what would take place. 'Practical therapeutics,' said I, 'are so far from being founded on scientific principles, are so much biassed by personal prejudice, so much swayed **Professional empiricism.**

by professional rivalry, and so apt to run from the extreme of scepticism to that of popular infatuation, that the opinion of the medical profession, with regard to the real worth and the relative value of the different preparations of oxydizable phosphorus, will not settle down until it has run the whole round of empirical and irrational experiment. When, however, the *phosphide* treatment has got beyond that stage of personal hostility which lasts so long for all therapeutical discoveries, when once the importtance in the system of the phosphide principle comes to be recognized, the medical profession will rush into the contrary extreme, and our *materia medica* will be overloaded with every possible form and preparation of phosphorus, just as has been the case for iron and mercury.' This lamentable state of confusion is, no doubt, another of the great obstacles in the way of the scientific cure and the stamping out of consumption by the hypophosphites. The profession will have to learn, that though their patients may get better, they may do so without getting well, and they can only hope to obtain definite and constant results by the knowledge and scientific use of ascertained and scientifically defined means.

Professional rivalry. Phosphide of zinc, etc.

472 A. But there is more still. Since I thus wrote, ten years ago, independently of the numerous preparations brought forward from commercial motives, professional rivalry has been eagerly but vainly seeking for some possible, if even inferior, substitute, which might be used in lieu of the hypophosphites. One instance will suffice. Some years ago, in Paris, the phosphide of zinc was brought forward as this long-wished for supplanter of the hypophosphites. This compound does not produce any immediate poisonous effect. It undergoes slow decomposition in the intestine, with the formation, among other products, of hypophosphorous acid. It was given in large doses to the patients, with the usual immediately invigorating effects of the compounds of oxydizable phosphorus, and was at once trumpeted forth as the

panacea the world had been vainly awaiting for so many centuries. Of course Dr. Churchill's theories, researches and results were carefully passed over in silence. But alas for the poor patients! even before the hypophosphorous acid could have time to produce the deleterious effects of its cumulative action, the zinc had come into play, had induced the usual consequences of chronic metallic poisoning upon the intestine and the system generally; the patients one by one shrivelled up and died, and nothing more was said upon the subject. At the moment of writing this I see this compound of phosphide of zinc again brought forward in London, either alone, or in combination with strychnia. No doubt, some day some chemist more outrageous than his compeers, will propose a compound of phosphorus and nitro-glycerine. The hypophosphites and *arsenic* are already in the market.

473. At the risk of appearing to digress and breaking the thread of my narrative, the matter is so urgent, that I must add something more to what I have already said concerning the dangers of *free* phosphorus, the more so as, yielding to the current which *now* runs towards compounds of phosphorus of any kind, without enquiry whether they be good, bad, indifferent, or dangerous, the authors of the last additions to the British Pharmacopœia, just published, besides the hypophosphites of soda and lime, which are now admitted for the first time, give two formulæ for preparations of phosphorus in its simple or uncombined state, 'phosphorated oil' and 'phosphorus pill.' In a pharmaceutical point of view, and in the present state of therapeutical science, only one epithet can be applied to these preparations—they are simply 'abominable.' If recently and carelessly prepared, the phosphorus may be altogether uncombined at the moment of administration, because a solution in oil, or a mixture with wax or balsam, does not constitute a combination. In that case it will set up local irritation, or even inflammation

The British Pharmacopœia.

Its mistakes.

Danger of its formulæ

(339), and invariably produce gastralgia, gastritis, congestion of the liver, and ultimately, if persevered in, hæmorrhage from the bowels. If prepared with very great care the phosphorus may be sufficiently divided to produce no local action, at least at first. If the preparations have been made long before use, the phosphorus may have become partially oxydized, and thus act as phosphorous acid, with the effects and dangers already alluded to. In older preparations the oxydation may have become complete, and the patient will be simply taking phosphoric acid.

Now all these dangers, uncertainties, and difficulties are avoided by simply limiting the use of the oxydizable phosphorus compounds to that of the hypophosphites, so that the question arises, why should these formulæ have been reintroduced into medical practice by the authors of the Pharmacopœia, when the imminent danger attending the use of free phosphorus has, for nearly a century and a half, caused it to be abandoned almost altogether? The answer to this is, that many men will not do a thing well, as pointed out by another, so long as he lives, if, by following some other course, they can hope to do it badly, or even not do it at all, provided only they can make a show of doing it.

473 A. To this must be added that the process indicated in the Pharmacopœia for the preparation of the hypophosphites is faulty and will only yield impure salts (92, 93).

474. This insertion of free phosphorus in the Pharmacopœia is the less excusable at the present time, because, independently of the fact that it had fallen altogether into neglect on account of the notorious danger attending its use, it has long been known that workmen engaged in the manufacture of phosphorus matches are subject to a dangerous malady called 'matchmakers' disease,' which depends upon the absorption into the system of phosphorus, either in the form of vapour or as phosphorous acid. This frequently attacks the lower jaw, particularly in the parts

Dangers of free phosphorus.

Dangers of phosphorus inhalations.

where teeth have been lost, and produces necrosis, or destruction of the bony tissue, often leading to a fatal termination. In spite of this well-known fact, physicians have lately been found to prescribe the inhalation of the fumes of phosphorus, or the use of phosphorized water as a spray, and some persons have even been stupid enough to think that that was my mode of treatment. The action of free phosphorus upon the tissues is perhaps the most painful and violent of any known. Burns produced by it often cause death, even when the injury is of very slight extent. The medical journals some time since reported a case of this kind which happened to a German physician. Many years ago, while carrying out my researches on the hypophosphites and hypophosphorous acid, I tried their effects on wounds and abrasions in my own person, and found their application was accompanied with very painful and persistent inflammation.

Thompson. Cotton.

474 A. Besides all these old and well-known facts, modern clinical researches have again shown the inefficiency and the danger of free phosphorus in Consumption in any form even when used with the greatest precautions. Several years ago Theophilus Thompson used phosphorus against consumption, but without success ('Lectures on Consumption'). Since then Dr. Cotton has again tried it with no better results ('British Medical Journal,' 1867) (51).

Williams.

Thorowgood.

474 B. Dr. C. J. B. Williams, in his work on 'Pulmonary Consumption,' p. 358, says: 'In two cases of paraplegia where I gave phosphoretted oil in very small doses, in a few days it produced jaundice, with tenderness and enlargement of the liver. No such effect followed the use of the hypophosphite.' Dr. Thorowgood ('On Consumption,' p. 38,) says: 'The oil in so small a dose as 10 drops of a solution of 4 grains of phosphorus in 1 oz. of olive oil ($\frac{1}{24}$ of a grain) is very nauseous to the stomach, gives a lucifer-match-like smell to the breath, and if persisted in causes jaundice and sometimes serious hepatic derange-

ment. It is therefore a troublesome and unsatisfactory medicine, and I have quite ceased to use it in practice for some years.'

Experiments by Wegner.

474 c. We shall easily understand the reason of this deleterious action of phosphorus by the experiments of Dr. George Wegner, of Berlin, who has lately published in Virchow's 'Archiv' some important researches on the subject, which are carefully summed up in an article of the 'Lancet' (October 26, 1872). Its most remarkable effect when taken for some time is the production of fatty degeneration of the liver, kidneys, stomach and heart; and at a later period, the establishment of a similar condition in the voluntary muscular system generally, in the unstriated muscular tissue of the intestines, and even in the lungs. Numerous hæmorrhages occur in all parts of the body owing to an extension of fatty degeneration from the heart to the entire arterial system. In women it leads to profuse menorrhagia, and to the production of hæmatomata, often of considerable size. Dr. Wegner, by experiments on dogs and rabbits, found that it had acted as a specific stimulant upon the osteogenous tissue, and the reviewer suggests that it might be used in diseases of children accompanied with deficient osteogenetic activity. He was probably unaware that these researches of Dr. Wegner on the specific stimulant action of oxydizable phosphorus on the animal system only corroborate what I had established fourteen years before as characteristic of the action of the hypophosphites (126, 127), with this difference, that while phosphorus is a highly dangerous and uncertain medicinal agent, the hypophosphites are a real *nutriment* (500). Not only may they be given in large doses without any poisonous effect, but they can be injurious only in case their physiological action is perseveringly kept up beyond due limits, just as happens with any other of the natural elements of the organism (497). The poisonous effects observed by Dr. Wegner were produced by doses as small as $\frac{1}{66}$ of a grain

a-day to rabbits and $\frac{1}{22}$ of a grain a-day to dogs. ('Lancet,' November 30, 1872). I have given as much as three and four grains of hypophosphite of lime—equivalent to *one whole grain* of free phosphorus (112 E)—daily to puppies, rabbits, and to human beings as much as twenty grains of hypophosphite, equal to five grains of phosphorus, for weeks together without any but beneficial effects (126). Dr. Wegner found that phosphorus produces chronic poisoning owing to its presence in the blood, and induces an exaggerated formation of compact bony tissue in places where it is formed naturally. When the hypophosphites are given in excess, the surplus of what is worked up in the system is excreted by the urine. Their stimulating action is not confined to the formation of bone, but extends to all the integrating functions of the organism (127, 531, 541).

474 D. I extract the following from the 'Lancet' of April 11, 1874, as a recent example of the manner in which these dangerous preparations of free phosphorus may be given under authoritative sanction:—'At the present time there is no therapeutic agent making greater strides in the estimation of the profession than phosphorus (472). It has many disadvantages against its use, such as its taste, smell, and comparative insolubility. We recently showed what an elegant solvent of phosphorus was resin, by which means it can be administered with precision and safety in the form of pills. Messrs. —— have now submitted to us a phosphorized cod-liver oil, a teaspoonful of which contains one hundredth part of a grain of pure phosphorus. It is palatable and nearly tasteless, being flavoured with essence of lemon. It must prove a very useful preparation *in phthisis*, and many of the wasting diseases.' There cannot be the slightest doubt that the use of this preparation in phthisis will be followed by the death of every one of the patients who take it (474 A, B).

Reception of my New Work.

475. I resume my narrative (472 A). While all these different causes were thus acting against the diffusion of my discovery, the publication of the second edition of my French work gave a new aspect to the controversy, and I may say settled the question as to the efficacy of the hypophosphites, at least for any unprejudiced person who will take the trouble to investigate it. From that time until now there has been scarcely any attempt to deny the validity of my discovery; but the battle is not over; all untruths die hard, and only the ground of the contest has been shifted.

In September, 1864, the 'Lancet' reviewed my work, and implicitly admitted the truth of my discovery. About the same time Dr. Thorowgood published his first series of cases, and in the same year a report was read to the Royal Society of Natural and Medical Science at Brussels by Dr. Bougard. Dr. Tirifahy, another member of the society, in the same year published a series of cases confirming this report. In December of the same year the 'Medical Times,' in a review of my French work, and referring to Dr. Tirifahy's report, concluded that the practice of competent observers in England entirely concurred with the results obtained by that physician. This action of the 'Lancet' and the 'Medical Times' was the more remarkable, and the more honourable, as up to that time they had been my uncompromising adversaries.

Almost universal adhesion of the Medical Press.

Most of the French and Belgian medical journals, among them the 'Gazette des Hôpitaux,' 'France Médicale,' 'Courrier Médical,' 'Journal de Médecine et de Chirurgie pratiques de Paris,' 'Le Scalpel,' 'Journal de Médecine et de Chirurgie de Bruxelles,' published reviews more or less commendatory of my work; and since then, so far as I know, there has not been published, except by Dr. Cotton, one single adverse criticism, either of my book, or of the theories or facts which it contained. Now this is not a small matter, for it is apparent that after the violent controversy which had taken place from 1858 to 1864, if my pretensions to have discovered a *specific remedy* for phthisis had not been based upon sufficient evidence; above all, had the new doctrine, that of *stœchiology*, which I brought forward as the starting point which had led me to this discovery, and as the foundation for all future research and discovery in therapeutics, been doubtful, or rather I should say, had it not been self-evident, it is inconceivable that some one of the many able writers in these journals should not have pointed out the flaws either in my facts, my theories, or my arguments.

Proofs.

The following quotations from some of the above-mentioned reviews will bear this out. I do not give them for the purpose of self-laudation, but to show that this statement is a bare expression of facts.

'Le Scalpel.'

476. 'Le Scalpel' (March 10, 1864) said: 'In 1857, when Churchill published the first edition of his book, *it met with the most complete scepticism*, which, however, failed to destroy the author's faith in the efficacy of his treatment. We are face to face with the greatest plague of the human race and with a physician of honour, who brings forward *a proposition of such audacity that it seems at first sight only one of those paradoxes which come and go in our troubled times.* To the practitioner it is a matter of secondary importance whether the discovery of a specific against the tubercular diathesis was arrived at empirically or inductively, but as Churchill proclaims war upon the anatomical school, as he is the father of a new medical doctrine, stœchiological pathology, we are bound to examine his treatment in the way the author himself gives it to us. We are bound to verify the two bases of this doctrine and see whether really tuberculosis is due to the decrease in the system of the oxydizable phosphorus, whether the hypophosphites correct this deficiency, and, above all, whether they are really efficacious against the tubercular diathesis. The

reader will be able to arrive at a conviction on this point by reading the remarkable chapter entitled " On the Mode of Action of the Hypophosphites in the Cure of Phthisis." Churchill starts from an hypothesis on the proximate cause of tuberculosis. This has led him to the use of a new therapeutical agent, the curative action of which serves as the proof and verification of the theory, after which, from the action of the remedy against the tubercular diathesis, he deduces a theory which explains the whole series of pathological phenomena connected with this class of diseases. As the reader sees, this is a strictly logical and legitimate process. We have only to ascertain first, whether the hypothesis as to the proximate cause of tuberculosis is true, and next, whether the curative action of the remedy is proved: "*naturam morborum ostendit curatio.*" The practical physician will not care whether the author was led to the use of the hypophosphites empirically after the example of those two illustrious empirics, Paracelsus and Rademacher, or whether he arrived at it inductively by a philosophic and scientific process.'

'La Gazette des Hôpitaux.'

477. 'La Gazette des Hôpitaux' said: 'For several years we have watched the cases of a great number of patients who were under treatment by the hypophosphites, particularly at the Dispensary, Rue Larrey, established by Dr. Churchill in 1857, and we can state that the rules of modern medical observation have most strictly been followed out by him in the long series of experiments which he has carried on since the time he read his first paper before the Academy of Medicine. Dr. Churchill's statement is, that phthisis may always be cured with certainty *under certain conditions*, which he has laid down with great rigour and accuracy. An assertion such as this requires complete and serious proof, and we think the reader will find it in the 137 cases, which are given at full length, and which occupy more than one-half of the

work we are reviewing. These comprise not only the successful results of his treatment, but also the incomplete results and the failures, and constitute a series of statistical data, such as is seldom met with at the present day. We think it is impossible to institute a series of experiments more conscientiously and more rigorously carried out according to the requirements of legitimate science than that contained in the first half of this work.'

'Journal de Medecine pratique.'

478. 'Le Journal de Médecine et de Chirurgie pratiques' said: 'We had intended to comprise in this review both Dr. Churchill's book and several other works on the same subject, but the extent of the first, the originality of its views, its reforming tendencies, the number of facts upon which it is founded, the contradictory results afforded by the use of Dr. Churchill's treatment in the hospitals, induce us to devote the whole of this article to the examination of his system, both the theory and the practice of which have been very inconsiderately decided upon by most French physicians. In order to obtain the results announced by Dr. Churchill, the action of the hypophosphites must be restrained within certain limits; the changes they produce in the system must be brought about slowly, and, so to speak, imperceptibly. When these conditions are neglected or forgotten, we often see patients die who were in a condition to have recovered had the treatment been properly used. Some time ago also we had occasion to point out that it was indispensable for the success of the treatment that the hypophosphites should be perfectly pure. This condition may be fulfilled by making use of those prepared by Mr. Swann, which is the course we ourselves always follow. . . . . We have no room to dwell any longer upon this important work, in which the author, by turns a chemist, a physiologist, and a physician, leads us from the most minute pharmaceutical details to the highest views of transcendental medicine. We may say with Dr. Churchill, that

by means of the theoretical and practical notions, of which we have endeavoured to give a condensed view, the practitioner, *who has made himself thoroughly master of the technical process*, will be able to foresee and predetermine the result of his treatment in any given case of pulmonary phthisis *with the same accuracy as we can now carry out a complicated and delicate experiment in chemistry or physiology.*'

479. 'Le Courrier Médical' said:—

'Courrier Médical.'

'Dr. Churchill's first researches were published in 1857. He has devoted seven years to the further study of his subject. On reading his book, we can at once see that he was well aware of all the difficulties of the subject; of the objections that would be raised, of the systematic opposition he would encounter, and that he shows himself ready to meet them half-way, by bringing forward such a number of proofs as would satisfy the most prejudiced. In spite of this general feeling, he has pursued his investigations upon a therapeutical subject, *which most people are ready to consider as fruitless as the search after the philosopher's stone.* The observations collected in Dr. Churchill's work constitute the most complete and satisfactory series of results ever published on the treatment of phthisis, not only by their mode of classification, but also on account of the time which has elapsed since they were observed, and the minuteness and precision of all the details connected with the diagnosis and the results produced by the treatment.'

480. 'La France Médicale' said:—

'France Médicale.'

'Dr. Churchill is not only a good chemist and an excellent physiologist; he is, above all, a practical physician. His clinical facts form a constant series of inductions, in which signs are always referred to their governing conditions, and results are made to constitute a science, because they are continually traced back to the causes upon which they depend. We think it will be difficult to read, with an unprejudiced eye, the series of observations contained in the work before us, without coming to the conclusion that the unknown condition, to which Louis referred the few cases of spontaneous cure hitherto observed in phthisis (44) is now discovered, and may be reproduced at will. No one at least in a question which is one of life or death for one-third of the adult population, has any right to reject Dr. Churchill's assertions without having arrived at a conviction on that point by his own personal researches. Two hundred and fifty-two fully detailed cases—comprising twenty-four cures of phthisis in the third stage; five cases of acute phthisis (these last the only ones of the kind hitherto recorded in medical science); a fair and complete statement of all the opinions hitherto published, either for or against the efficacy of the hypophosphites by thirty-one different physicians, with the results observed in the treatment of more than 150 patients, besides those treated by Dr. Churchill himself—such is the amount of clinical materials upon which Dr. Churchill asks for the judgment of the profession.'

Brussels Society of Natural and Medical Sciences. Bougard.

481. Dr. Bougard, Vice-president of the Royal Society of Natural and Medical Sciences at Brussels, in a report published in the 'Journal de Médecine et de Chirurgie de Bruxelles,' after a long and minute analysis of the work, expressed himself as follows:—'The society thus sees that the results announced and obtained by Dr. Churchill, go beyond anything which has hitherto been done in the treatment of this fatal disease. As for delivering a decisive judgment on the curative value of his treatment, I must confess my personal inability to do so; neither my own experience, nor that of any one of us, would be sufficient to decide so important a question. But our collective experience may, perhaps, help to clear up the point. I therefore appeal to you, and will set the example myself, by reporting three cases, which appeared to be in a favourable condition for the use of the hypophosphites,

and which were cured. No doubt, gentlemen, I do not consider these facts sufficient of themselves to establish the efficacy of the hypophosphites. I merely bring them forward as evidence, for in a question of such importance we must not decide without sufficient and conclusive proof. I will add that Dr. Churchill's work is written with remarkable talent, rare elegance of expression, perfect lucidity, and profound science. I propose a vote of thanks to him, and that he should be elected a corresponding member of this society.' This report was unanimously adopted. See Dr. Bougard's cases in Appendix III., Cases 56 to 58.

Tirifahy.

482. Six months later Dr. Tirifahy, responding to the appeal made by Dr. Bougard, laid before the same society the reports of forty-two cases, which he had treated by means of the hypophosphites. These will be found in Appendix III., Cases 59 to 100. Dr. Tirifahy concluded as follows:—'These facts establish the action of the hypophosphite of lime in phthisis. I do not look upon this remedy as the *specific* (228, 235) of this fatal disease. But one thing is evident. It has given me a number of cures that, no doubt, every other mode of treatment will look upon with envy. I therefore advise the use of this remedy against pulmonary tuberculosis, *in all stages* of the complaint.'—('Journal de Médecine et de Chirurgie de Bruxelles,' August, 1865.)

483. In December of the same year, Dr. Henri Van Holsbeck published the remarkable statement I have already referred to (186), in which he acknowledged the mistakes he had made in his first attempts at using the hypophosphites; and how, having corrected those mistakes, he had afterwards achieved uniform success.

'The Lancet.

484. The 'Lancet,' which up to then had been uniformly and violently hostile to my pretensions (September 3, 1864), published the following in its review of my work:—

'Dr. Churchill has fairly made good his claim to a second hearing. Our readers do not need to be informed that the views which he originally propounded in 1857 encountered a very formidable opposition, and were, in fact, totally rejected by a large number of the highest authorities on the treatment of phthisis. The principal *gravamen* of the case against these views was the charge, that they were based to a great degree on mere theoretic speculation, unsupported by a sufficient number of carefully observed facts; and it is the merest justice to say that on this score the present edition of Dr. Churchill's work tends very materially to weaken the position of his antagonists, since it records a body of no less than 133 fully detailed cases of phthisis, treated according to the method which he advocates; *the result of which certainly appears amply to bear out his views, so far as regards the efficacy of the treatment.* This single fact would fully entitle the author to claim from his opponents a careful revision of their opinions, and, in the interests of science and humanity, we would urge that this revision should be strictly and impartially carried out.

'It is not, however, with the analysis of the clinical observations of Dr. Churchill that we shall now concern ourselves; the task of such an examination would be far too exacting of time and of the space which this journal can devote to reviews. We invite the attention of our readers to certain considerations which the author urges with great force in reply to the charge of theorizing, that has been repeatedly made against him, and which sound the depths of an abyss of confusion and darkness, that has engulfed whole legions of experimenters in therapeutics.

'The present century has witnessed a general revolt against the old dogmatic systems of medicine, and the establishment in high places of the maxim that "observation is everything in science." The revolt against dogmatic medicine was just and necessary. The maxim which it has introduced is neither true nor safe.

'The students of every other science have long since learned that pure empirical observation can accomplish nothing of value, and that, in fact, observation is only useful in advancing knowledge, when it is aided by the employment of the inventive faculty in the formation of hypotheses. But the students of medicine stand in the position—ludicrous to the bystanders, and painful to their best friends—of affecting to make use of empiric observation only, and to discard theory altogether, and this attitude is especially assumed by inquirers in therapeutics. As might be expected, the issue of all this is the practical adoption of a theory or theories more complicated, more dogmatic, and more self-contradictory than Hippocrates himself could have propounded. If any one desires an instance, let him take up any recent treatise on general therapeutics (*e. g.* Pereira, Headland), and attempt to seize the drift of the writer's ideas on the classification of remedies.

484 A. 'It comes to this in short—that the free thinking of the present day on the subject of the use of remedies is for the most part not a pure and honest scepticism, but combines the confusion of an aimless empiricism with the positive assertions and the intolerance of dogmatism. Unfortunately these assertions are the echo of the worst, and not the best dogmatic traditions. They embody phrases which (all unconsciously to their modern employers) have descended from the darkest periods of metaphysical biology, and it is needless to observe that where such phrases are employed in classification they produce the maximum of mischief. One has only to cite the application of the term "irritant" to strychnia, in virtue of its power (*in poisonous doses*) to produce convulsions, to exemplify this confusion in the most striking manner, and the reader who will follow up the train of ideas which this example suggests, will arrive at the conclusion, melancholy but inevitable, that *a science of remedial actions worthy of the name does not exist* (468).

'Dr. Churchill presents, in his introductory remarks, substantially the view which we have thus expressed, and which is the result of our own reflections pursued for a long time past. He demands that the cant of a profession of pure observation so much affected by the schools of minute and dead-house pathology, may cease, and that men may be forced to open their eyes to the fact, that no one is so hopelessly bound in the chains of tradition, as the self-styled pure empiric, who will not indeed make any theories for himself, but simply takes them when he is driven to seek their aid at haphazard from the lumber-room of the past. He maintains, with justice, that what we absolutely require at the present moment is the formation of precise "secondary theories," in order to a rational conduct of our investigations in practical medicine. It was the employment of just such an hypothesis which has conducted him to a practice which appears to have met with great success in his hands.' . . . .

484 B. 'In our opinion the hypothesis, of which Dr. Churchill has made use, is none the less philosophical, nor the less likely to have led him to a *correct practice*, although it may be erroneous in some particulars, as indeed we think it is. He has seized on the central idea, which so much needs to be developed with regard to tuberculosis, that this disease must certainly lay hold primarily on that part of the organism, which subserves the high purposes of preserving its general organic unity. This is his merit; the defect of his reasoning we submit is that he has not recognized the immense part which the nervous system plays in this great work, and the possibility that the molecular changes, which are the point of departure in the disease, commence in that system (370—377). Experience is every day demonstrating the value of phosphorus administered in the form of the alkaline hypophosphites, in the treatment of nervous dyscrasiæ. It may hereafter prove, perhaps, that *the beneficial influence of the hypo-*

phosphites in phthisis is due at least in great part to their favourable action on the nutrition of the nervous system' (118, 127).

'Medical Times.' 485. In a review of my work and of Dr. J. E. Pollock's (Physician to the Brompton Hospital) on the Prognosis of Consumption, the 'Medical Times' (December 23, 1865) said:—

'While Dr. Pollock aims at giving a review of his subject as far as is at present known, Dr. Churchill boldly steps forward with a new theory and doctrine. His views will be familiar to many readers, and our present object in noticing his second edition is, not so much to furnish an analysis of its contents as to ask for a dispassionate estimate of their truth. Phosphorus and the hypophosphites burst suddenly on the world some few years ago as a panacea for the commonest of all diseases. Their value was no doubt overstated, and prejudice was excited by an unwise secresy as to their nature (459). They were hastily and scantily tried, found not in every case to be successful, and as hastily abandoned. We submit that the subject was far too soon put out of court, that some published experiments are painfully inconclusive (460), and that others look as if the observer had already judged the case unfavourably before he began (461, 463). On the other hand facts of a positive character are coming to light which should correct our *primâ facie* views. One such may be cited in the communication of Dr. Tirifahy to the Medical Academy of Brussels published in the Journal for August last (482). He narrates, in detail and with most convincing impartiality, the results of forty-two cases thus treated by himself. Of these eight are so far cured that the presence of tubercle cannot now be substantiated, eight others improved greatly, and six to a less degree. The author of the paper very judiciously concludes that the drug is of real value. He is far from considering it a *specific* in *all cases* (151, 156, 228, 235, 236), and freely admits that "even though phthisis is cured by all treatments—nay gets well itself without treatment (33—43)," yet *any formula hitherto in use may well envy these results. This opinion will, we can state most positively, be confirmed by competent observers in England.* In the admitted insufficiency of our present treatment we are not justified in rejecting any promise of amelioration. No doubt the scepticism, with which every novel proposal in medicine is met in this country, tends to prevent hasty and unprincipled experimentalism, but it is an error, if we allow the feeling to degenerate into inactivity, prejudice, or routine.'

486. Dr. Barella in an article in 'Le Scalpel,' December 20, 1868, states the current opinion on the Continent with regard to the hypophosphites. 'There is not a single organ of the French or foreign medical press, which has not published cases *conclusive* as to the therapeutical value of the hypophosphites *in every stage of* consumption. Many of these cases have been collected in the public hospitals. In the present state of science, and although we have to deal with a disease, which has been looked upon as incurable, and which carries off one-third of the adult population, *it is a fact, which nobody will now deny, that the treatment by the hypophosphites produces remarkable and in some cases immediate effect.* The cases of cure are the more numerous in proportion as the disease itself is less advanced (165). Discussion has been exhausted as to Dr. Churchill's doctrine, which, as we know, is founded upon the principle of stœchiology, that is to say, upon the study of the constituent elements of the proximate principles of which our system is built up. Dr. Churchill *does not pretend, as has been asserted, to cure those who are already dying.* His treatment (by the hypophosphites) is the specific remedy for the diathesis or general condition, and *not for the local disorganization* to which it leads. *He therefore pretends to cure only under certain*

'Le Scalpel.'

conditions, and by following certain rules, which he has minutely explained in his work on the subject' (151—156).

Dr. Fedeli. 486 A. Dr. Fedeli, one of the leading physicians in Rome, published in 1868 a work entitled 'Trattamento delle Malattie del Petto col mezzo degl' Ipofosfiti, per il Dottor J. F .Churchill,' which is in great part a translation of a small French work of mine ('Recueil d'Observations, Mémoires, Rapports et Documens sur le Traitement des Maladies de Poitrine,' Paris, 3e édition, 1868). In his preface Dr. Fedeli makes the following statement:— 'On my arrival in Paris to attend the Medical Congress in August, 1867, I was glad to accept Dr. Churchill's invitation, and verify by personal investigation at his public dispensary the reality of the facts he had published. Thanks to his cordial co-operation, and his readiness to place in the fullest light the cases which I was specially anxious to examine, I was able to convince myself of the positive benefits conferred by his treatment upon the poor consumptive patients, who had recourse both to his science and his philanthrophy, after having vainly followed other modes of treatment. I examined by means of auscultation and percussion a large number of patients who had been ill for variable periods of time, some as long as a year or more, and who had been or still were under his treatment, and on comparing their condition at the time of examination with the history of their symptoms at the time they began the treatment, I could arrive at no other conclusion but that it was impossible to doubt the improvement effected by the hypophosphites. All of them, men or women, young or old, in words full of joy and gratitude, agreed in stating that shortly after beginning the treatment they found their strength begin to return, their appetite, which some had entirely lost, immediately improved, cough was lessened, expectoration decreased, fever and night sweats diminished. The well-being and improvement made such progress, that at the end of a few days patients who thought they had one foot in the grave found themselves full of hopes of recovery. Consumptives who followed the most laborious occupations assured me that they had been able to return to work which they had been obliged to give up owing to their total loss of strength. After such proof I think there can be no appearance of absurdity in asserting, as I do most conscientiously, that *at Dr. Churchill's dispensary I saw patients entirely cured of tuberculosis*, after having shown, in some cases for several years, all the progressive symptoms of *the second*, and in some cases even *of the last stage* of phthisis. These facts, of which I have been the eye-witness along with many other physicians, several of whom have already published the results of their experience (477), ought to be sufficient to induce all medical practitioners who are true lovers of their art and of the good of mankind, to try with confidence a mode of treatment which has been embraced by eminent practitioners of all countries, and which truly entitles Dr. Churchill to the gratitude of his professional brethren.'

Other Italian physicians.

486 B. While this sheet has been going through the press I have received a new edition of Dr. Fedeli's work, embodying twelve cases from his own practice, and opinions, reports, and cases from Dr. Matteo Lanzi, physician in chief to the Roman hospitals, Dr. Cesare Fabbri, of Monte Marcio, Dr. Tommaso Panegrossi, Dr. Felippo Cerasi, editor of the Roman Archives of Medicine and Surgery, Dr. Luigi Geraldi, chief physician to the hospitals, Dr. Todini, Dr. Alessandro Ascenzi, Dr. Lieto Regnoli, chief hospital physician, Dr. Valentini, formerly physician to the military hospital in Rome, Dr. Luigi Casati, head physician of the hospital at Forli and editor of the 'Raccoglitore Medico' (the Medical Compiler), Dr. Pio Blasi, chief physician of the Roman hospitals, Dr. Borromeo, chief medical officer of the Roman railways, and

Dr. G. Fiorelli. These will be found in Appendix III., and afford ample and valuable proofs to be added to those already reported in favour of the efficacy of the hypophosphites (170—187).

Present state of the question in England and abroad.

487. It may be thought that after such strong and decided testimony as that the reader has just read, the hypophosphites might be considered to have safely passed the ordeal of controversy and contradiction, and that now their value in phthisis was recognized by those whom the profession usually look to for guidance in such matters, they would come into still more general use, that their action would be more carefully studied, that practitioners would hasten to use them, not as a last and desperate resource, but in the earliest possible stage of the disease (165, 188), and would be too happy to be thus enabled successfully to combat one of the greatest scourges that afflict mankind. In spite of the slow rate of medical progress and the many obstacles in its way (467—474), such has been the case on the Continent and in America. The hypophosphites have been placed among the primary, that is, the most important medicines of the last United States Pharmacopœia, and *my* hypophosphites are now almost universally (in spite of piratical counterfeits, 469 B) employed not only throughout the Continent of Europe, but in the United States, in Canada, in Brazil, Chili, Peru, and the other South American States. In England, although the last supplement to the British Pharmacopœia has admitted the hypophosphites of lime and soda, it can hardly be said the treatment has made much progress. *Since the year* 1870 *perhaps the reverse has taken place.* In that year, owing to the siege of Paris, I left that city, where I had been living or practising for nearly twenty-five years, where for fourteen at my public dispensary, Rue Larrey, I had ministered gratuitously to the relief of the consumptive poor, and where I am happy to say I had made many true and warm-hearted friends in all classes

of the population from the lowest to the very highest, and took up my residence for a time in London. Whether that can have had any influence upon the matter I leave to be determined by those who are initiated in the mysteries of London professional life, but I call the reader's attention to the following facts:—

Decrease of consumption within the last *ten* years.

487 A. In the year 1866 the Registrar-General reported a falling-off in the mortality from phthisis. This produced considerable sensation, and was attributed to different causes. Dr. Buchanan attempted to show that it was owing to improved drainage ('Tenth Report of Medical Officer of Privy Council for 1867,' London, 1868, p. 57).

This, like most superficial opinions, has become current, and was lately publicly quoted by Dr. Lyon Playfair; but the decrease in the mortality of consumption is not confined to newly drained districts. The same has been observed in Paris and elsewhere.

487 B. Four years after, the same decrease was again noted. In the Thirty-third Report of the Registrar-General (Returns for 1870) Dr. Farr says: 'Allowing for erroneous diagnosis does not account for the decrease in the mortality from phthisis from 3·03, 2·79, and 2·82 per 1,000 in the three years, 1853–1855, to 2·40, 2·41, and 2·44 in the last three years' (*i.e.* 1868, 1869, 1870).

'The Lancet' on this subject.

488. On May 11, 1872, the 'Lancet' published a leading article on the same subject, where we meet with the following remarkable passages, in which Dr. C. J. B. Williams and Dr. Henry Bennet are personally called upon to state the results of their experience:—

'*The treatment of phthisis has so strikingly improved, and the results are so much more satisfactory than they once were* (484 B), that we are apt to think that no more remains to be done.

'*One physician after another tells us that in this its commonest form* (*Consumption*) *tubercle is ever so much more amenable to treatment than it used to be* (476, 479).

We should be sorry to seem to say a word in disparagement of the present treatment of phthisis as set forth by all authoritative writers at the present day. Our present object is rather to indicate what we have gained by it, and, secondly, to point out some respects in which it is unpractical. We must not attribute all arrest of tubercular disease to treatment, which we have been rather apt to do, for such arrest occurred frequently in a large (!) proportion of the population dying after forty, before cod-liver oil was used (see Chap. II.). But it is equally beyond doubt that *the present treatment of phthisis is beneficial.* We must accept the evidence of plain facts on this point, whether the clinical records of such practitioners as Dr. Williams and Dr. Henry Bennet, or the obvious effects of treatment witnessed by practitioners daily in increasing appetite, weight, and strength, and in diminishing cough, perspirations, expectoration, and waste. There is one element of treatment much urged by all the specialists on this subject, which, to repeat our own word, is unpractical—we mean the climatic element. *We want, then, to know more of the possibility of curing phthisis under the conditions of our own fickle and somewhat rough climate.* Dr. Henry Bennet's experience of phthisis as controlled by all the comfortable conditions of life in the Riviera *is very striking*, but it is only tantalizing to people who cannot take themselves to Mentone, but must stay in England (423—437). Dr. Williams's large experience is liable to the same criticism, that it applies for the most part to comfortable people who can give up work and reside abroad for one or more winters. A remedy like this is simply no remedy to the majority of people. Hence we urge upon physicians dissatisfaction with themselves *till they have shown the profession how to control phthisis at home. Doubtless good air, good food, etc., plus cod-liver oil, are, as Dr. Henry Bennet says, the principal curative agents.* But we are sorely in need of means of getting such influences to bear on the mass of patients, and it is still a desideratum in medicine to *show how best to treat phthisis successfully among the not rich* (59—64). Clearly they are often the subjects of arrested phthisis. What we want is to define more accurately the way in which cases of such arrest may be multiplied.'

Had the author of this article never by any chance heard of the hypophosphites? Not to speak of the many foreign observers whom I have quoted throughout this book, had he never heard of the paper read before the Junior Medical Society of London by Mr. Wilson, as mentioned in the 'Lancet' itself in December, 1863? had he forgotten the 'Lancet's' own article (484) in September, 1864? Mr. Taylor's (181) in 1861, Dr. Vintras's (182) in 1863, both in the 'Lancet'? that of the 'Medical Times,' (485) in December, 1865?—to say nothing of the different articles published by me and others in the 'Medical Circular.' Had he never heard of Dr. Thorowgood's important researches and the successful results which had attended his use of the hypophosphites (170—187)?

As since this article was published, two years have elapsed, and neither Dr. C. J. B. Williams nor Dr. Henry Bennet has thought proper to respond to this appeal, although in this present age of sanitary solicitude for the poor it was plainly their duty to do so, I shall endeavour to bring forward testimony under their own hand which will afford the writer in the 'Lancet' the information for which he and the profession have been for two years waiting in vain.

C. J. B. Williams.

489. I must first of all, once more, place before the reader the remarkable statement made by Dr. C. J. B. Williams in 1862, already quoted:—

'I have notes of *seven thousand cases* of phthisis, and I find the average duration of life under the disease has been four years; they have terminated in the immense majority of cases in death. The experience of Louis and Laennec gave an average duration of two years; so that *by the introduction of cod-liver oil and* other agencies we have lengthened the period and doubled its duration. What further? This is only a minor success—a prolongation of life. Can we claim success—a cure? It is doubtful; I can hardly say.

'I have notes of patients who, having presented the usual unequivocal signs of phthisis, have lived afterwards from two to eighteen years in comparatively good health; but it were hard to say whether they were perfectly cured. Phthisis is a constitutional disease, and it is hard to change the constitutional character. I have notes in this period of only twenty-four cases to which the word "cured" could be applied. They have gone on from two to eighteen years in fair health, and filling their places as useful members of society.

'Of *partial* cure, cases in which the duration of life has been prolonged beyond the average of four years to a longer period, I have thirty-one cases of prolongation from six to thirty-one years. They have passed these years in a considerable degree of comfort, and with the ability of fulfilling their social duties and partaking in rational pleasures. These persons are now living; their life has been rendered useful and comfortable, and they may yet live for many years.

'I have another set of cases in which, although *death has followed in almost if not quite all of them*, life was prolonged to a considerable extent. There are twenty cases in which it was extended from six to sixteen years. *These three classes make up in all seventy-five cases. These are all the successes of which I can boast'* (Dr. C. J. B. Williams, Lumleian Lectures on Failure and Success in Medicine, the 'Lancet,' April, 1862).

The 'Edinburgh Review' on this subject.

489 A. In July, 1872, the 'Edinburgh Review' in an article on Dr. Williams's work on 'Pulmonary Consumption' thus referred to the improvement which had taken

place in the treatment of phthisis:—'When Dr. Williams commenced his investigations in this particular field of research, and when Laennec and Louis were still the great authorities on the subject, the duration of consumptive disease was held to be, on the average, two years. From Dr. Williams's selected cases it appears that the duration of the disease is now eight years. . . . The reason for the auspicious change in the duration of the disease, Dr. Williams remarks, is unquestionably the better understanding of the cause of the disorder, and the consequent improvement of its treatment by the physician. His testimony upon this point is very interesting and clear. He says that during the first ten years of his experience the beneficial results of treatment were small, and limited to the influence, in certain cases, of a sea-voyage and residence in mild climates. In the next ten years of his experience a marked advance was obvious, and attributable to the employment of a more liberal diet and the use of the iodide of potassium and of vegetable tonics as medicines. But *in the last ten years* the improvement was very considerable and marked, and in the main, due to *the general use of cod-liver oil in consumptive cases.* His own words in regard to this royal medicine for consumption are: "I have no hesitation in stating my conviction that cod-liver oil has done more for the consumptive than all other means put together."'—'Edinburgh Review,' vol. cxxxvi., pp. 242, 243.

489 B. Since then Dr. Theodore Williams has read in the joint names of himself and his father two papers to the Royal Medico-Chirurgical Society. In the first, founded upon 1,000 cases of phthisis selected from the practice of Dr. C. J. B. Williams, the author states that only 198 patients died, 802 were still living; 72 per cent. had regained their health sufficiently to follow their occupations, and 28 per cent. were still invalids.—'Lancet,' January 21, 1871.

In another paper he gives the results produced by warm climates in the treatment of pulmonary consumption as exemplified by an analysis of 251 cases, taken from the practice of Dr. C. J. B. Williams and himself. These patients had passed periods varying from one to eleven winters in warm climates out of the United Kingdom; only forty of these climate cases had died, and 202 were living at the last report. ('Lancet,' May 4, 1872). I confess I do not understand Dr. Williams's paper, for, after giving us these stupendous results, he says, 'The statistics showed plainly that life was prolonged by residence abroad, though to a small extent, the average for each patient being 2½ winters.'

However this may be, one thing is very evident, namely, that since 1862, Dr. C. J. B. Williams has very much altered his opinion as to the curability of phthisis, as is shown not only by his own statement, but by the remarkable article in the 'Lancet,' to which I have just referred (489). Instead of *seventy-five cures which*, in his own words, *are all the successes Dr. Williams could boast of out of* 7,000 recorded cases, all treated by means of the *Royal remedy*, *cod-liver oil*, we have 800 cured or arrested out of 1,000, and 202 out of 251. This is a wonderful difference, and it is evident that so striking a change between the results obtained up to 1862 and those which are announced as having taken place during *the ten following years* must be owing to some very potent cause. That it is not due to what the 'Edinburgh Review' calls the Royal remedy, cod-liver oil, is apparent from the fact that Dr. Williams expressly says that the 7,000 cases observed up to 1862 *had been treated* by cod-liver oil. There can be but one of two solutions of this difficulty. Either since 1862 Dr. Williams has discovered some new method of administering cod-liver oil, which gives it a potency he himself had never found in it before, with which it has hitherto never been credited, and which new method Dr. Williams has not yet published to the world, or else, besides the cod-liver oil, his patients have been taking some other remedy, which in these papers he does not mention. Perhaps the following extract from his own work on phthisis will clear up this obscurity ('Pulmonary Consumption,' London, 1871). He says, p. 326: 'The hypophosphites of soda and lime, so strongly recommended by Dr. Churchill, of Paris, have in my hands proved decidedly beneficial in certain cases. They have been tried by Drs. Quain (463) and Cotton (461) at the Brompton Hospital, with only negative results (463A); but having met with several patients who distinctly ascribed their improvement to Dr. Churchill's treatment, I have thought it right to try them myself, both as a substitute for the oil and in addition to it (211). In the former way the results have not been generally satisfactory: the hypophosphite does not disagree, but there is no marked improvement as under the oil (209, 211, 446); and when they have been doing well under the oil, the patients generally lose flesh and strength when the hypophosphite is substituted for it (519). On the other hand, it has happened to me in several cases that *a patient has long been taking the oil, and, after having derived great benefit from it, halts in his improvement, or even loses ground, and then the addition of the hypophosphite has been followed by a marked change for the better; flesh and strength have been gained, and the chest symptoms have been more or less improved.*'

Now, according to Dr. Williams's own statement in 1862, with cod-liver oil alone he had not, up to that time, cured two per cent. of the cases in which it had been used.

But as, after the oil has failed, the hypophosphites in several cases have been found useful by him, he must have thought it his duty at least to try them, at some period or other, for every patient who was not getting well with the oil alone (530, Case cxvii., 547).

It follows, therefore, that he must have used the hypophosphites in 98 cases out of every 100.

Either Dr. Williams cures his patients with the hypophosphites or he has some remedy which he has not hitherto divulged.

The reader, perhaps, will ask how this opinion of Dr. Williams with regard to the efficacy of the hypophosphites, after cod-liver oil and all other means have been tried and have failed, can be reconciled with the results obtained at the Brompton Hospital, so loudly proclaimed by Dr. Quain, and so persistently by Dr. Cotton. According to these two gentlemen, after four successive series of experiments, the hypophosphites were found *perfectly inert*, and it has gone abroad to the whole world that such is the decision of the staff of the Brompton Hospital, a hospital which was expressly established, not only for the relief of consumptive patients, but specially for the purpose of improving the treatment of this fatal disease. Now if Drs. Quain and Cotton are physicians of the Brompton Hospital, so also are the two Drs. Williams, father and son. Dr. C. J. B. Williams occupies, in fact, the highest rank on the staff, being Senior Consulting Physician. Have I been misinformed or not, when I was told, upon certainly very good authority, that the hypophosphites are *now in constant use* at the Brompton Hospital? And if such be the case, how is it the old negative decision is allowed still to pass current among the profession and among the public? Is it for the benefit of the patients, for the interests of humanity, or for the interests of the hospital? Do Drs. Quain and Cotton think they would have lowered their reputation by following the example of Dr. Van Holsbeck (186, 483)?

Brompton Hospital.

490. Does this account for the immense improvement which appears to have taken place in the results obtained at the hospital, if we compare the statement made in the annual report for 1873 (p. ix.), where 896 patients were *discharged many of them greatly benefited* out of 1,211 (nearly 75 per cent.), and only 93 died, as compared with

the results obtained up to the year 1850 at the same hospital, in which there was only relief in 25 per cent. and arrest of the disease in 6 per cent. of the cases, and also with the results from 1854 to 1862, in which, out of 5,564 cases of certain phthisis, there were but 210 cases of arrest (36, 37, 38)?

Henry Bennet.

491. As we have previously seen (435), about fourteen years ago, shortly after the publication of my discovery, Mentone suddenly came into great repute as a resort for the consumptive. This was altogether through the writings of Dr. Henry Bennet. Dr. Henry Bennet is well known in London and Paris. He takes care to keep himself well before the public and the profession; by his publications, if not by his research and original investigation, he has attracted a certain amount of notoriety, as is evident from the leading article of the 'Lancet' just quoted, and might, if he had been so inclined, have done as much as any man, except myself, to spread the use of the hypophosphites, and thus have conferred a positive good on mankind. I should much have preferred passing over Dr. Henry Bennet's case in silence, as I had done in the Second Edition of my French work in 1864, but Dr. Bennet has not understood the reason of this reticence, and, as he seems particularly anxious to draw me out, I shall let him and the public have the benefit of my opinion. Dr. Bennet has himself given us a history of his own case, which the reader will find in Appendix III., Case 101. According to Dr. Bennet's statement, he was told by his friend, Professor Hughes Bennett, of Edinburgh, 'that he had two cavities in the upper lobe of the right lung, one anteriorly large, and the other posteriorly small, and that if the disease continued to progress as it was then progressing he, Dr. Henry Bennet, would be dead and buried in less than a twelvemonth.'

Dr. Bennet further says that he was indebted for the cure of his case to Dr. Quain, Dr. C. J. B. Williams, and Professor John Hughes Bennett, but makes no mention of Dr. Churchill. Neither does he mention the mode of treatment followed. He merely states at the head of his cases (2nd Edition 1871, p. 144) that 'as case reading is proverbially tedious, he has omitted all the details of treatment, and refers the reader to the preceding pages, all having been treated on the principles therein detailed.'

We must now, therefore, go to what he says upon this point, but I must previously add a supplementary statement of my own, which is, that Dr. Henry Bennet, after consulting the gentlemen whose names he has mentioned, and before going to the South of France in the year 1859, came to Paris, and consulted me. He stayed at Versailles for some time, and called upon me occasionally in Paris to talk over his case. Before coming to me he had been taking the hypophosphites, but without benefit. I pointed out the mistakes he had made by using them in too large doses, and along with other remedies, more particularly phosphoric acid and cod-liver oil. Under my treatment he improved very rapidly, and either before he left Paris for the Riviera, or on his return thence—I am not sure which—he called at my house, and, as I was absent, said to a near relative of mine: 'I would not leave Paris without seeing you or Dr. Churchill; *parce que je lui dois la vie'* (I owe my life to him). I must confess, I was much gratified, first of all, on Dr. Bennet's own account, who had been my fellow-student in Paris, and next, because—as the controversy about the hypophosphites was at that time raging, and Dr. Bennet had been lately occupying the influential post of sub-editor of the 'Lancet'—he was in a better position than probably any man then living to give a decisive opinion on the subject and induce the profession in England to give the new treatment that fair and dispassionate attention which is always so necessary in matters of the kind, and which also is always wanting. But Dr. Bennet returned to London in 1860, and, as I gather from Dr. Copland's work 'On Consumption and Bronchitis,' showed himself to his professional friends as an example of the efficacy of the climate of Mentone in arresting pulmonary consumption. Dr. Copland states (p. 303) that Dr. Henry Bennet resided at Mentone during the winter and spring of 1859 and 1860. He then gives Dr. Bennet's account of the climate of Mentone, expatiates on the benefits derived from it by some of the visitors, and says: 'I had the pleasure of seeing Dr. Bennet on his return from Mentone, and he then had the appearance of sound health' (p. 304). Nowhere does he even hint that Dr. Bennet gave any credit in his own case to, or made any mention whatever of, the use of the hypophosphites.

Shortly afterwards Dr. Henry Bennet began publishing a series of articles in the 'Lancet' on the climate of Mentone. The scientific authority and wide-spread influence of the 'Lancet,' Dr. Henry Bennet's connection with it, and, above all, the example of his own case, produced very great impression, not only in England, but in America, and in all English-speaking communities. These articles were published from time to time from July, 1860, to August, 1863.

I was not aware that Dr. Henry Bennet had been so very reticent while in London, and naturally watched these articles with a certain amount of interest and curiosity, expecting in every new article to meet with some word about the hypophosphites; but I waited in vain—Mentone had done it all.

To this wonderful climate, to this new world for the consumptive, of which Dr. Henry Bennet was the Columbus, was all the merit to be attributed. All Society talked of Mentone, and the whole world of consumptives rushed there: English, Americans, French, Russians, Germans, all went to it as the haven of their hopes. Meantime, I learned that Dr. Henry Bennet was himself applying the treatment which had proved successful in his own case, and I must confess, that if not vexed, because I had already begun to be accustomed to such things, I did feel somewhat disappointed in Dr. Bennet.

In August, 1867, at Dublin, before the British Medical Association, Dr. Bennet read a paper on phthisis, and his own cure by the influence of climate, which is fully reported in the 'British Medical Journal' (Oct. 26, 1867), but there is no mention in it either of Dr. Churchill or the hypophosphites.

If I mention for the first time this, to me very unwelcome subject, after having kept silence for fourteen years, it is, as I have said, not only because I think I should be failing in my duty if I were silent any longer, but also because Dr. Bennet himself seems extremely anxious that the matter should be ventilated, as will appear from the following extracts from the two editions of his work on 'Pulmonary Consumption,' where the reader will see the main facts admitted under his own hand.

In his first edition, 1866, at page 37, he says:—	In his second edition, 1871, at pages 99, 100, 101, he says:—
'Preparations of phosphorus, and especially the hypophosphites of soda and lime, were introduced by Dr. Churchill some ten or twelve years ago as a positive remedy for pulmonary phthisis. This is still Dr. Churchill's belief; *and I, who have known him from early life, am convinced that he is sincere—that he really*	'In 1857 Dr. Churchill read before the French Academy the first memoir, in which he claimed for phosphorus and its preparations the position of actual antidotes to pulmonary phthisis, and to tubercular disease in general. This claim he has subsequently endeavoured to substantiate, in a work published

First Edition, 1866.	Second Edition, 1871.
believes that he has found an antidote, a remedy for pulmonary consumption.	in French, in Paris—" De la Cause immédiate de la Phthisie pulmonaire et de Traitement par les Hypophosphites," second edition, 1864.
'The subject has, of course, much occupied my thoughts, and during the last *seven* years *I have administered the drug to a large proportion of those whom I have attended.*	'The subject has naturally much occupied my thoughts, and during the last *twelve* years *I have administered these preparations to a large proportion of those whom I have attended.*
'Were I only to quote the successful cases that I have had under my care, the cases in which the tubercular disease has been arrested, and even cured, *I could furnish Dr. Churchill with many instances of cure, myself included*, which have apparently taken place under the influence of the hypophosphites, as they were *long and constantly administered.* But, on the other hand, I have quite as many, *perhaps* more, cases of death to narrate in patients whose condition admitted of recovery from the extent of the disease, and who persever-	'Were I only to quote the successful cases that I have had under my care, the cases in which the lung disease has been arrested, and even cured, *I could quote many instances of cure, myself included*, which have apparently taken place under the influence of the hypophosphites, as they were *long and constantly administered.* But, on the other hand, I have quite as many, *perhaps* more, cases of death to narrate in patients, whose condition admitted of recovery from the extent of the disease, and who perseveringly took the hypophosphites

First Edition, 1866.	Second Edition, 1871.
ingly took the hypophosphites from the beginning to the end. 'Were the preparations of phosphorus given really an antidote to the disease, and the cause of the recovery in the first class of cases, they ought also to have cured many of the latter, for they were all placed under the same hygienic and social conditions.' . . . . (151—156).	from the beginning to the end.' . . . .
'It is worthy also of remark, that I have always administered either Dr. Churchill's own preparations, or salts furnished by his own manufacturer, so that there is a certainty as to the genuineness of the drugs used.'	'It is worthy also of remark that I have always administered either Dr. Churchill's own preparations, or salts furnished by his own manufacturer, so that there is a certainty as to the genuineness of the drugs used.' . . . .
'The above views must have gained greater credence and weight with the profession than is generally admitted, for *I am seldom consulted by a new patient at Mentone, each successive winter, without finding that he or she has been taking* phosphorus in some shape or other, and *that*, when the prescriptions are signed by	'*I wish I could add that Dr. Churchill, enlightened by his own experience and that of others, now took a more sober and rational view of the value of these preparations, but I am bound in the cause of truth to say that he does not.* He appears, both from his writings and practice, not to recognise the constant

First Edition, 1866.	Second Edition, 1871.
the heads of the profession. Indeed, although I do not think Dr. Churchill is warranted in claiming for phosphorus the position which he gives it as a "remedy" for pulmonary consumption (235, 236), I consider that the thanks of the profession are due to him for directing our attention to a valuable therapeutic agent in this dread disease.'	powerlessness of the hypophosphites to arrest or to cure pulmonary phthisis.'

I will not make any remark upon the difference between the manner in which I am spoken of in the first and in the second editions of Dr. Bennet's work, nor on the significant suppression in the second edition of the portion of the last paragraph in italics quoted from the first edition. I will simply draw the reader's attention to this very pregnant sentence: 'Were I only to quote the successful cases that I have had under my care, the cases in which the tubercular disease has been arrested and even cured, *I could furnish Dr. Churchill with many instances of cure, myself included*, which have apparently taken place under the influence of the hypophosphites, as they were long and constantly administered. But, on the other hand, I have quite as many, *perhaps* more cases of death to narrate in patients whose condition admitted of recovery from the extent of the disease, and who perseveringly took the hypophosphites from the beginning to the end.'—p. 37, ed. 1866. From this it appears that Dr. Henry Bennet cured *one-half* or very *nearly one-half*, *himself included*, of the whole number of patients whom he treated by the hypophosphites. He states that in his own case he took them for five years (ed. 1866, p. 39), and I will leave the reader to make his own reflections upon the following facts:—First, Dr. Bennet returned to London after his first winter's residence at Mentone, and allowed it to go abroad to the world, at least through Dr. Copland's book, that the climate of Mentone was the only active cause of cure in his own case. Second, he published a series of articles in the 'Lancet,' which afterwards appeared in the shape of a voluminous book and went through three editions from 1859 to 1865, on the climate of Mentone and its curative efficacy in phthisis, in which book not one syllable is said about the hypophosphites. Thirdly, he read a paper before the British Medical Association to show the efficacy of climate in phthisis as shown by his own recovery, and made no mention of the hypophosphites. Fourthly, at the end of seven years, viz., in the year 1866, he recognized for the first time publicly the existence of the hypophosphites, and then it, *for the first time*, appeared that both he himself and a *large proportion of* his patients had during the whole of that time been taking the hypophosphites. Fifthly, he claims that he cured *nearly one-half* or *fifty per cent.* of the whole number of those treated by the hypophosphites; *this in consumption*, hitherto regarded as almost the most incurable of diseases. Sixthly, unwilling to allow that there could have been any mistake in his mode of treatment, such as he had shown in his own case up to the time of his consulting me, any imprudence on the part of the patients, any counteracting influence produced by the jumbling together of antagonistic modes of treatment, such as cod-liver oil (205, 211), iron (208), stimulants (210), etc., or by injudicious hygienic measures, such as cold-bathing (223), open windows (221, 222), to which from Dr. Bennet's book it appears his patients are subjected, Dr. Bennet attributes all his failures in the use of the hypophosphites to the intrinsic want of efficacy in the remedy. In a word, he generously sets down all his failures to me, and all his successes to himself and Mentone. Seventhly, although Dr. Bennet gives minute reports of eleven cases, several of them in the third stage, *including his own with two cavities*, which were all cured on the principles which he has detailed, *i.e. the hypophosphites*, nowhere does he say that he has ever cured one single case without them, nor when speaking of the other remedies, such as iodine, cod-liver oil, etc., does he say that he has cured one-half, one-third, or even one single case of the patients treated with them.

British Medical Association. Dr. Parkes.

492. In 1873, at the meeting of the British Medical Association, Dr. Parkes, Professor of Hygiene in the Army Medical School, Emeritus Professor of Clinical Medicine in University College, F.R.S., after entering into long details as to the connection or supposed connection between tubercle and inflammation, continued as follows:

'But how in this whirl of controversy, in this endless assignment of names, and discussion of what these names mean, how has the *practical physician* who had to treat phthisis found his practice changed? In some ways favourably, in others, as I conceive, unfavourably. The principal change in the treatment of phthisis has been the introduction of the supporting plan, based on the idea of tubercle being the indication of a weak, morbid nutritive condition. Cod-liver oil, practically unknown in my student days, re-introduced in this country (after long years of forgetfulness) by Hughes Bennett, and tested by Charles Williams, has become an article of commerce on an enormous scale; good feeding in other respects, and exercise and pure air to improve the pulmonary circulation, are the main grounds on which many practitioners treat phthisis; so far, the effect of the view of phthisis to which I have referred has been most useful. But in another aspect, I doubt whether we have not somewhat lost in the little attention paid until lately to the inflammatory conditions. Formerly there was a vast amount of local counter-irritation and even local blood-letting.

certainly seemed to be very useful, and of measures used with the idea of removing exuded inflammatory products, such as the preparations of iodine and even mercury. There are many cases of phthisis which appear to be largely benefited by measures of this kind, or by a union of the two plans, and, in so far as the common notion of the peculiar specific nature of tubercle discouraged the use of anti-inflammatory measures in some cases, so far I conceive harm was done.

'In two points late researches have, I think, influenced our view of looking at phthisis. In the first place, it has been shown how many cases of phthisis are caused by removable conditions; breathing of impure air, constrained positions, syphilis, &c., are now known to produce many cases of wasting lung diseases; and as it is possible to prevent these, and thus to lessen the prevalence of phthisis we have now a greater element of hope than formerly. On the contrary, the evidence of the so-called infective nature of phthisis—that is, the way in which it can originate in the lungs from distant infected parts, the way in which it extends to adjoining parts, or, perhaps, to distant parts of the lung by absorption from a diseased lung centre, and thus returns and returns, until fatal inroads are made on the organ, or the system at large, the constant production, in fact, of fresh centres of spread—is a discouraging aspect. On the whole, the last *thirty* years (489 A) have done much for the treatment of phthisis, but it is not all unmixed gain, and the amount of future progress is uncertain.'—'Lancet,' August 9, 1873, p. 179.

Such is the maundering twaddle put forward as the reflections of a 'practical physician.' 'This whirl of controversy, this endless assignment of names and discussion of what names mean,' is what he had to offer on the subject of phthisis to the representatives of the whole British medical profession. Upon the causes of the improvement in the treatment of phthisis within not the last *thirty*, but the last *ten* years (487 A, 487 B, 488, 489 A), he could throw no light at all. Of the hypophosphites, which hundreds of the members of the Association, and according to Dr. Henry Bennet, *the heads of the profession* were using or had used (491), not one word was said either by him or by anybody else.

This is the last ordeal of the inventor before his apotheosis. Among artisans, it is called 'rattening;' in science, it constitutes the well-known process which the French call 'the Conspiracy of Silence.'

492 A. I offer no comment upon these facts. I have endeavoured to state them as simply and as briefly as possible, consistent with clearness. I am not conscious of having overcharged my statements. I pretend not to judge the motives which may have induced such men as Dr. Quain, Dr. Cotton, and the whole staff of the Brompton Hospital, Dr. C. J. B. Williams, and Dr. Henry Bennet to act as they have done. I leave the public to judge whether in a question which involves the health, the happiness, and the lives of millions of human beings, the want of a positive and final solution is to be laid at my door or not. If there be anywhere a failure of duty, I am conscious that I am not the offender. After all, I do not see that personally I have much cause to complain of these gentlemen. They at least have authenticated with their responsibility the utterances they have given to the world, and if any of them has erred he has himself provided the means of redress. The question I have raised is so important, the requirements for its satisfactory solution are so many, the interests of all kinds opposed to it are so numerous and powerful, that I know much allowance should be made for all who attempt to handle it, and then shrink from the danger it involves.

492 B. But behind these who have placed their views upon public record there are the anonymous foes. I

might have spoken of them, and here again in so doing, I might truthfully disclaim all personal animus. The blows struck at me have fallen only upon the sick and upon the poor. I might have spoken of the gross and grotesquely ignorant disparagement with which myself and my discovery are often coupled by men who hardly know the name of either. I might have told of physicians who are public teachers; men whom the rising medical generation look up to for guidance and example; who for many years past have been continually prescribing the hypophosphites for most, if not all, of their consumptive patients; yet who, as far as I am informed, have made no mention of them to their pupils, and in their published utterances have simply dismissed them with a sneer. I might have said that London is perhaps the only civilized capital in the world where I could have spent four years without a word of recognition from the medical press, from any medical body, or save in a few instances from any member of the profession. I might have told of a disgraceful intrigue, by which it was sought to strain against me the power of the Medical Council, and which was only put a stop to by a threat of legal proceedings. I might have added darker instances still, and shown how, while all public allusion to me or to my discovery has been carefully suppressed, the weapons of slander, 'whose edge is sharper than the sword,' and of private malignity, have been unscrupulously and systematically employed. I refrain. I think with the great Roman orator that envy is the shadow of merit, '*hoc animo semper fui, ut invidiam virtute partam gloriam putarem non invidiam*,' and I fear that if the reception in England of my discovery on its first appearance seventeen years ago, and its treatment now in its mature state, were put together, many might be led to conclude that conventionalism and trades-unionism have eaten the pith out of English medical science.

493. The reader who takes the trouble to reflect upon the preceding chapter, will, I think, be led to the following conclusions:— Summary.

I. Within the last *ten* years there has been an appreciable falling off in the mortality of consumption in England and Wales (487).

II. This was at first attributed to a change in the climatic conditions of the country, owing to improved drainage. But this reason has since been found inadequate and untenable, nor would it account for a similar decrease having been noted in France and in America.

III. It is now admitted by the medical profession that it is to be attributed to improved treatment (488).

IV. Hence the question arises—What are the *new* factor or factors in the treatment to which this improve ment is due? The following considerations will show where the conclusion lies.

V. Simultaneously with this observed decrease in the mortality is to be noted the extensive, although, in many cases, the empirical and unscientific, employment of a new remedy (consisting in the use of *oxydizable and assimilable* compounds of phosphorus), the hypophosphites, which, seventeen years ago, was brought forward as a *scientifically conditioned specific* of tuberculosis.

VI. That this claim is founded in fact is now placed beyond a doubt:

By the independent testimony of a number of physicians of all countries bearing witness to the striking, and, until then, unhoped-for power of this remedy over all the symptoms of the disease, as shown by the expressions '*remarkable*' (176), '*unhoped-for*' (174), '*surprising*' (481), '*most extraordinary*' (179), '*magical*' (171, 181 A), '*wonderful*' (187), with which many of the first observers have characterized it;

By the evidence they have given of its curative efficacy in *all stages of the complaint* (175, 176, 179. 181, 182, 185, 187, 485, 486);

By the fact that this efficacy is limited only by the amount of *already existing lung disease* (486);

By the no less remarkable circumstance that conditions (such as those of heredity and youth) which otherwise are the most unfavourable, are those in which it is most efficacious;

And by the unavoidable inference that the curative results have been proportionate to the care and skill with which it has been administered.

VII. That the use of this remedy is the real cause of this decrease in the mortality is shown by the striking although unwilling testimony of the two physicians who have been specially and publicly appealed to by the leading Medical Journal (488), as being most competent to give evidence on the subject; Dr. Bennet confessing that he has given the hypophosphites to *a large proportion* of his patients, and that *nearly fifty* per cent. of those so treated have got well; Dr. Williams acknowledging that *with cod-liver oil alone*, previous to 1862, he had not cured two per cent. of his patients; that when the oil fails, he finds the hypophosphites to succeed, and that since 1862 (*i.e.* since the introduction of the hypophosphites) he has cured seventy-five per cent.

VIII. These astounding admissions cannot be got rid of by keeping up a confusion between the hypophosphites and free phosphorus or the phosphates. Drs. Williams and Bennet used neither phosphorus nor the phosphates, they used *the hypophosphites*, and besides there is not upon record a single case of the cure of consumption by free phosphorus (which has been tried and failed over and over again—474), nor by the phosphates unless they contain *phosphorous* acid, or are merely the hypophosphites in disguise (470 A).

IX. That this confusion should be designedly kept up is easily explained by the number of people interested in the sale of remedies which, under the name of phosphates or some other, really contain some oxydizable compound of phosphorus (470), such as phosphorous acid; or oftener still are merely the hypophosphites themselves, disguised by their mixture with useless or frequently hurtful substances (470).

X. This would not be possible if it were not for the very imperfect knowledge of chemistry among the medical profession (468, 469), and the still more imperfect state of therapeutics (484 A).

XI. The real difficulties which prevent the settlement of this question are however neither of a scientific nor even of a commercial character; they are created by the personal hostility of some of the leaders of the profession here, who have passed the word to stifle all public discussion of it, and by the peculiar and altogether anomalous condition of the medical body in England, which would not be tolerated for a moment in any other country, and which places in the hands of any anonymous ring the scientific and social status, the character, the professional prospects, and, as proved by melancholy facts, the very life of almost any member of the profession who dares to deviate from the barren path of conventionalism and ignorant routine hedged in by a mediæval organization of trades-unionism.

XII. To this must be added the open or secret opposition of a number of persons who are interested in the present state of things, from those who deal in cough-mixtures and cod-liver oil to those who speculate in lands or houses in some fabulous paradise for Consumptives, not to speak of the legion of pirates and plagiarists, who for seventeen years have been preying both upon the hypophosphites and the public.

My object in writing this chapter, to which I have been unwillingly led, is to show that, however impossible it might have appeared seventeen years ago to find a *remedy* for Consumption, the scientific difficulties in the way of such an unhoped-for result were nothing compared to the impediments which class rivalry, commercial competition, the murderous sin of adulteration, the dishonest spirit of plagiarism and piracy, the imperfect condition of medicine as a science, and the grievous want of anything like true professional conscientiousness, have opposed to the general diffusion and acceptation of my discovery. If the reader has been induced to come thus far from the interest he is compelled to take in this melancholy subject either on his own account or that of some one near and dear to him, he will find that the matter relates much more nearly to himself than it can by any possibility to me, and that I have been fighting his battle and not my own. However, it is, perhaps, better that these things should have been, otherwise the issue spoken of in the next chapter would never have been raised. I might have again made a similar blunder to the one I committed seventeen years ago. There is a battle which sooner or later must be fought out, and the sooner the better for all concerned. It may as well be begun by me as by another.

If I should appear to have laid too much stress upon what may look like a matter personal to myself, if my language should seem too strong to some of my readers, let them go to the *seventy-eight thousand* unfortunates who are now suffering and dying from consumption in this country; let them go to those whose households have been stricken, perhaps made desolate for ever, by the death of some of the *forty thousand* victims cut off by this scourge every year; let them go to those mourning homes, those bruised hearts, and say, 'Within the last few years there has been a great improvement in the treatment of consumption, there are means which, in the hands of one physician have rescued nearly *fifty per cent.*

of the victims of this plague, in those of another nearly *seventy-five* per cent., in the foremost establishment devoted to this deadly evil the number of the rescued has nearly trebled; but the conditions which produce such wonderful results are as yet undetermined, and the minds of the profession are undecided. It is true a claim has been made that they are nothing but the use of a *definite specific remedy*, which was introduced as far back as *seventeen years* ago, which at first was scouted as no better than so much saw-dust, but which since has forced a place for itself both in the British and American pharmacopœias, which is now used throughout the world, and the efficacy of which is substantiated by the testimony of physicians of all countries. It is admitted that it certainly was used in the two first instances, and probably also in the third; but the trade ethics and instincts, above all the code of false honour, which binds together the members of the profession, which bids them be

'True to themselves, if false to all besides'—

this unwritten code, more potent than laws and decalogues, keeps them faithful to their leaders, and *they* have forbidden all public discussion of the question' (492). Let any of my readers go and say that, and see what language will then be used.

CHAPTER X.

STŒCHIOLOGICAL MEDICINE—INHALANTS.

Principle of stœchiological medicine. 494. My discovery of the specific remedy of phthisis was not a lucky accident, but a deduction from a general principle different from what has hitherto been admitted in medicine, and which will be the foundation of the medical science of the future.

As the reader who has accompanied me thus far may perhaps feel some slight curiosity to know somewhat more of the starting-point and as it has since led me to other practical consequences, which to the special class of persons who are likely to take up this book, will be of greater interest still, I shall proceed to explain as concisely as possible what is the fundamental principle of stœchiological medicine.

The current doctrine in pathology is that all disease is organic or structural. Walshe, a very competent authority on the subject, expressly says (Walshe 'On the Lungs,' 1871, p. 1): 'The existence of disease involves that of anatomical change, not only in the part originally affected, but also in the structures immediately adjoining. There are a few apparently dynamic diseases forming in the present state of knowledge putative exceptions to this proposition; but admitting their reality, they are not sufficiently numerous to negative the general truth.'

Andral, one of the leading physicians of our time, says: 'Physiology leads to the conclusion that every alteration of the solids must be followed by an alteration of the blood, just as every modification of the blood must spring from a change in the solids of the system ('Anatomie pathologique,' tom I. p. 528).

My doctrine of stœchiology is diametrically opposed to this, and as I stated ten years ago ('De la Cause immédiate de la Phthisie,' etc., Paris, 1864, Preface, p. 8), 'the study of organic lesions, as isolated phenomena and independently of the antecedent molecular changes by which they are brought about, is only of value from the stand-point of diagnosis or prognosis. It is and will remain barren of all application to therapeutics. The present anatomical school has therefore gone astray from the true scientific path. It endeavours to deduce morbid physiology, that is, the phenomena of disease, from the organic lesions, just as healthy physiology is theoretically a deduction from normal anatomy. This is exactly the opposite to the truth. Every organic lesion of internal origin can only arise from, and must have been preceded by, some disordered physiological condition, some disturbance in the function of assimilation. Now, as this latter function operates exclusively upon the proximate principles, which are the sole intermediaries between the organism and the external world, whence it draws its materials, it follows that every disturbance of organic nutrition necessarily implies some modification of the proximate principles. By this view the different and conflicting doctrines which have hitherto divided the cultivators of medical science into hostile and intolerant factions are reconciled under one superior idea. The different conceptions called vitalism, physiologism, humorism, and organicism are thus shown to be one-sided views of a higher and superior principle, that of stœchiological physiology. It is this principle which has led to the discovery of the specific remedy and the scientific theory of tuberculosis. It opens up a new field for pathology and therapeutics, where it will one day be possible to arrive at similar results for other incurable diseases—which stand as so many mournful problems, the scientific key to which is as utterly unknown to us at the present day as it was two thousand years ago, in the infancy of medical art.'

Since this was published in 1864, I myself, in pursuance of experiments dating much farther back, have arrived at several other practical results in therapeutics, some of which are equal if not superior in value to the discovery of the medicinal action of the hypophosphites. This I shall come to further on, but I must first explain in what the doctrine of stœchiology consists.

All living beings in a constant state of change.

494 A. All living beings are distinctively characterized and distinguished from the inorganic world, in which they exist, by the unceasing exchange which is going on between the cosmic medium and the organism itself, attended with corresponding and simultaneous decay and reconstitution of its parts. Life has been compared to a vortex, or eddy of wind, which temporarily takes up a certain amount of matter, keeps it in motion for a while, and then lets it drop into the apparently inert condition from which it was raised.

Two primordial functions in living beings.

Integration and disintegration.

495. All living beings therefore present two great primordial functions, that of absorption and assimilation, by which new matter is taken up and incorporated into the system, and that of disintegration and excretion, by which that portion of the living substance which has sufficiently subserved its function in the organism is again cast out. The equilibrium of these two great primordial functions, and of their subordinate processes, constitutes health. The disturbance of that equilibrium, whether temporary or permanent, is disease.

Conditions of vital processes.

495 A. These two functions, as all other living phenomena, are dependent upon certain conditions, which may be classed under the heads of mechanical, physical, chemical, and vital or biological. We may take as ex-

amples of the disturbance of mechanical conditions the fracture of a bone and its attendant suffering and consequences; of the disturbance of the physical conditions, the action upon the system of intense heat or intense cold; of the disturbance of the chemical conditions, the breathing of carbonic acid or of air too largely mixed with it; and of the disturbance of the vital or biological conditions, all those which disturb the normal functions and all those which produce disease. Each of these classes of conditions taken in the order enumerated is of greater importance, and has a wider influence, than the conditions of the class which follows. Thus, the disturbance of a mechanical condition may immediately entail a whole series of physical, chemical, and biological modifications; while the biological condition will in general only react more remotely and indirectly upon those of a more general order. For instance, exposure to extreme cold will immediately produce torpor or arrest of all the functions, followed by death. Here is a physical cause putting an immediate stop to all the functions. In another way certain states of defective nutrition will be attended with a deficient supply of earthy matter to the bones, thus rendering them brittle and liable to fracture through the slightest cause. Here is a mechanical condition produced by a biological perturbation. The influence of these three first conditions upon the normal existence of the organism, and upon its abnormal or suffering states, has been well understood from early times, and much elucidated by modern experiment and research, particularly with regard to the chemical processes. But with regard to the vital or biological, we are hitherto quite in the dark.

Fundamental error of present medicine

496. The present medical school takes the diseased organ as the starting point, and thence endeavours to work out the problem of the nature of the disease. It is surprising that this should be the case, and it shows

little men are in the habit of reflecting either upon what they teach or upon what they learn. As just stated, not only the organs, but the blood, the humours, in a word, every part whether solid or fluid of the living being, is in a constant and simultaneous state of decay and renovation. So that the organs themselves are being continually pulled down and rebuilt interstitially, that is bit by bit, by the inherent powers of the system. Now it is self-evident that under such circumstances there can be no organic lesion, that is, no decay of an organ, and consequently no decay of the system, as long as the effete matter is normally got rid of, and its place supplied by an adequate supply of new and proper material. Hence, too, it evidently follows that there can only be four great causes of disease—first, mechanical conditions; second, physical agencies; third, chemical reactions; and fourth, perturbations of nutrition, including under this term, not only the integration, but the disintegration of organic material.

Cell theory. 496 A. Of late years the great progress made in the study of structural and microscopic anatomy has led pathologists and anatomists to fancy that they had at last found the foundation stone for which they have been digging and groping so long, and the cell theory was brought before the world as the primordial principle which was to explain all things. But these hopes have been lamentably disappointed. The microscopist is only an anatomist with a big eye, and though he can show us that all the elements of the system are built up of cells, that the first appearance of organic structure always assumes that form, we are no nearer to the end of the riddle than we were before. Not a single problem of pathology has yet been solved by microscopical anatomy (349—492). Even if we had a complete and accurate history of the cellular pathology of each morbid entity, this would still be only a matter of diagnosis, the question would still remain how and why these morbid cells arose? Even could we trace their descent from normal structures we should still have to find the *cause of this aberration.* So that the problem is once again brought back to the point I have already stated (496), 'In what abnormal conditions, either of the quantity or the quality of the elements of nutrition, can these new morbid cell-formations arise.'

Elements of nutrition.

497. The function of nutrition in living beings is not carried on at random and applied indifferently to all substances, whatever be their nature. To continue the simile already used, the living vortex will not take up all kinds of matter indifferently. The life of vegetables chiefly depends upon their meeting with a sufficient supply of congenial mineral elements; animals require not only mineral elements, but an adequacy of matter which has already undergone a primary degree of organization. Just as vegetables draw their nutriment from minerals, animals draw theirs from vegetables, or from other animals. Each substance thus attracted into the system by the living vortex is required to be in a certain state both physical and chemical, failing which it is not taken up by the organism at all. Even when taken up by the organism, if deficient in some requirements, it may be rejected from the system without being utilized, or may, if incorporated into it when in an abnormal state, immediately give rise to abnormal phenomena.

Proximate principles.

498. The nature of the different substances which constitute living beings, has within the last few years been much cleared up by modern chemistry. They have received the name of *proximate principles*, because they act in the living being a part similar to that which is played by the elementary principles and their compounds in inorganic chemistry. For instance, just as common salt consists of two simple bodies, chlorine and sodium, just as marble consists of lime and carbonic acid gas, so the elementary tissues and the organs of living beings are

built up with proximate principles. Muscle or flesh consists mainly of a particular contractile matter disposed in discs or layers of a substance or proximate principle called syntonine. The brain and the nerves consist of tubes, which contain a peculiar fat called brain fat, cerebrine, cerebric acid, or protagon. They also contain other proximate principles, such as albumen, which is the same as the white of the egg, and casein, which is the same as the curd of milk or cheese. A similar enumeration might be made with regard to all the solids and to all the liquids of living beings. These different proximate principles, although themselves composed of numerous elements, act and react upon one another as units. They are the stones and the mortar which build up each individual part of the system. One remarkable feature in their history is that they are not all generally or equally diffused throughout the system. Some have a more general, others a more limited range. Some are to be met with in almost every part of the system, others are exclusively confined to one or several organs. The importance of this fact has been amply shown in the history of the *phosphide* element (331—337).

Application to physiology.

498 A. Now as every normal function in the system, every vital manifestation, is attended with a waste of the substance of the organism, that is, of some one or more of the proximate principles, so also every abnormal state, every disturbance, whether functional or organic, must proceed from, or be attended with, a disturbance either in the quantity or the quality of some one or more proximate principles. The objective of medical science should therefore be the study of each and all of the proximate principles which go to make up the system. When once we shall have arrived, for any class of living beings, at a complete knowledge of the history of each of the proximate principles they contain, from the moment it appears in the system until it is thrown out, when we shall have suc-

ceeded in ascertaining how these different proximate principles act and react upon each other, the place they occupy in each system or in each organ, the part they take in each function, the manifestations produced by each of their disturbances or alterations, we shall be scientifically masters of that class of living beings, and shall manage them with as much certainty as we now do a steam-engine or a musical instrument. This is not a mere enthusiastic dream. Chemistry already gives us abundant proof of the feasibility of such things, and the whole practice of modern agriculture, and of the rearing of stock, as based upon the scientific use of composts, manures, and foods, initiated by the illustrious Liebig, is founded upon no other principle than this.

Already applied to agriculture and zootechny.

No doubt we are still far from the practical realisation of this doctrine as applied to disease. But this idea is the compass which had hitherto been wanting to medical science, and with it we may boldly launch out into the region of the unknown. Already there are certain general consequences of the doctrine which may be laid down, if not as certain, at least as highly probable.

Some primordial, others secondary.

498 B. The different elements constituting the living organism are of different importance and value. Some appear to be chiefly statical, others are essentially dynamical (322—326). Some have no affinity for oxygen, while others have, and these last on that account hold, so to speak, a kind of supremacy over the rest (328). It will follow that the deficiency of a secondary proximate principle will often only be temporary, and may entail no modification of the rest, while the want or the deterioration of a primordial principle may entail that of a whole series of subordinate compounds. The organism unaided may be unable to repair this want. So that the object of therapeutics is to discover the means of supplying this deficiency.

This stœchiological doctrine immediately leads to two or three consequences which I pointed out many years ago ('De la Cause,' etc., 1st edition, p. 261), and which will no doubt hereafter be turned to account.

Stœchiological classification of diseases.

499. It gives us a fundamental classification of diseases, and shows us that each group of morbid phenomena must be referred to an etiological condition in the system, that is, to their cause, and that all diseases must belong to one of the three following classes: First, a decrease or a deficiency of one or several of the proximate principles. These may be called 'oligoses.' Second, an increase of some one or more of the proximate principles. These may be called 'hypermetroses.' Third, a deterioration of some one or more of the proximate principles. These would be called 'dyscrasiæ.' To the first of these classes may already be referred, even in the present state of our science, tuberculosis or phospholigy, that is, a weakness of the integrating or reconstructing power in the system owing to the deficiency of the phosphide element, the varied states called anæmia, spanhæmia, or chlorosis, which might be called 'siderology,' or the want of iron in the blood globules and in the system, and scurvy, which may be owing to the want of potash in the system. To the second class belong most probably such diseases as rheumatism, gout, and cancer. To the third, ergotism, or the disease produced by eating ergot of rye, syphilis, all the diseases caused by the different poisons and zymotic diseases, that is all those produced by miasmata and contagiums, miasmata evidently acting as poisons, and contagious or infectious matter setting up among some one or more of the proximate principles a process analagous to that of putrefaction or fermentation.

Classification of remedies.

500. Corresponding to this classification of diseases we also have a natural classification of therapeutic agencies. A first class is that of bromatological or nutrimentary medicines. This comprises all foods, all elements of the system, all proximate principles, all assimilable substances, which may all be classed under the name of nutriments.

The second class consists of substitutive medicines, such as, although not natural constituents of the system, may for a time or partially fill the part of a biological element or of a proximate principle. The third class comprises toxical remedies or poisons, those which are incapable of taking any part in vital action, and which arrest, impair, or destroy the normal functions. As instances of the first class already in use may be given all nutrimentary substances, salt, sugar, flesh, water, and among those which are now looked upon as medicinal agents, phosphorus in the form of hypophosphites, iron, pepsine, pancreatine, etc. *Free* phosphorus, on the contrary, belongs to the third class. To the second class of substitutive medicines may be referred iodine, bromine, and their compounds, which probably act in the system as substitutes of the chlorides, their chemical homologues, carbonate of lime as a biological homologue of phosphate of lime, manganese of iron, arsenic, and perhaps antimony of phosphorus. To the third class of therapeutic agents may be referred the immense group of poisons, mineral, vegetable, and animal, and the great mass of drugs, which unfortunately have hitherto engrossed almost the whole sphere of therapeutics.

As science advances, it will be found that owing to the scientific conception of the subordination or hierarchical dependency of the proximate principles, the number of diseases will be much diminished, as they will be referred to a smaller number of primary and elementary conditions. The remedies of the first and the second class will become more numerous, and they will increase in value as their action is better understood, while those of the third class will be gradually eliminated, and perhaps as remedial agents will be finally abandoned altogether.

New method in medicine.

501. The doctrine of stœchiology involves not only a new classification of disease and a new conception of remedies, but a fundamental change in the method of the

science itself. Each living being is in itself a unit, and many of the proximate principles are diffused throughout the system in such small quantities that they may long elude the analytical powers of chemistry. It is therefore likely that most of the advances made in the direction of stœchiological medicine will be by means of partial and hence limited and definite hypothesis and experimental verification, so that medicine after having been the least will become the most inductive of all the physical sciences. But this will be done scientifically, by a careful and exhaustive study of each step in the process, and not according to the present gross system of ignorant empiricism, which merely consists in trying without rhyme or reason, any drug or substance provided it be new. The therapeutist of our day is like a magpie to whose acquisitive propensities nothing comes amiss from a dirty piece of rag to a silver spoon.

The whole of this book is an endeavour to show how this method has been successfully applied to tuberculosis, how an hypothesis as to the nature of the disease was arrived at inductively from a small number of incomplete and contradictory data, how from this hypothesis was deduced a mode of treatment, the efficacy of which has been demonstrated by the clinical experience of others as well as of myself; and, lastly, how from this starting point was evolved a theory which shows the connection and inter-dependence of nearly all the facts hitherto ascertained with regard to tubercular diseases.

Its application to cholera. 502. The doctrine of stœchiology is too recent and hitherto too little known, the difficulties in the solution of medical problems are so enormous and the deterrent reasons against attempting discoveries in medicine are so powerful, that since then no further applications have been made of it.

Beaufond. An effort has, however, been made in this direction by Dr. Papin-Ruillier-Beaufond, a pupil of Dr. Robin, who in a thesis maintained before the Faculty of Medicine of Paris, has endeavoured to establish the stœchiological theory of cholera, based upon chemical researches made under Dr. Robin's direction and in his laboratory by the author himself and Dr. Papillon. ('Doctrine Stœchiologique du Choléra d'après les Travaux recents,' par A. Papin-Ruillier-Beaufond, Paris, 1866.) There is no doubt that this idea will be worked out, and ultimately lead to a successful result. Dr. Robin by his celebrated work on the *proximate principles* ('Chimie Anatomique,' par Robin et Verdeil, Paris, 1853), and by his philosophical conception of their classification and properties, is the man who has done most towards laying the foundations of Stœchiology.

Stœchiological inhalants.

503. I myself have been for many years engaged in researches based upon stœchiological principles concerning the nature and treatment of those diseases of the respiratory organs which are not of a tubercular character, and in the year 1868 I arrived at the discovery of a series of new chemical compounds which act as normal stimulants of the respiratory apparatus. These substances are administered in the form of spray, and deserve the name of 'Stœchiological Inhalants.'

Local treatment of lung disease.

504. The local treatment of respiratory diseases has been for centuries one of the chief desiderata in therapeutics. The idea of treating diseases of the lungs by applying a remedy directly to the diseased parts is so natural that from the earliest times attempts have been made in that direction. The following are a few examples:—In the middle of the 17th century a great number of such efforts were made, as may be seen by referring to Christopher Bennett's work on the subject published in 1654. Shortly after the discovery of oxygen, at the end of the last century Beddoes and Watt experimented the use of oxygen and other gases, such as carbonic acid gas, in an establishment opened for that purpose. At the be-

Beddoes and Watt.

science itself. Each living being is in itself a unit, and many of the proximate principles are diffused throughout the system in such small quantities that they may long elude the analytical powers of chemistry. It is therefore likely that most of the advances made in the direction of stœchiological medicine will be by means of partial and hence limited and definite hypothesis and experimental verification, so that medicine after having been the least will become the most inductive of all the physical sciences. But this will be done scientifically, by a careful and exhaustive study of each step in the process, and not according to the present gross system of ignorant empiricism, which merely consists in trying without rhyme or reason, any drug or substance provided it be new. The therapeutist of our day is like a magpie to whose acquisitive propensities nothing comes amiss from a dirty piece of rag to a silver spoon.

The whole of this book is an endeavour to show how this method has been successfully applied to tuberculosis, how an hypothesis as to the nature of the disease was arrived at inductively from a small number of incomplete and contradictory data, how from this hypothesis was deduced a mode of treatment, the efficacy of which ha been demonstrated by the clinical experience of others a well as of myself; and, lastly, how from this startin point was evolved a theory which shows the connectio and inter-dependence of nearly all the facts hitherto asce tained with regard to tubercular diseases.

Its application to cholera.

502. The doctrine of stœchiology is too recent a hitherto too little known, the difficulties in the solution medical problems are so enormous and the deterr reasons against attempting discoveries in medicine are powerful, that since then no further applications have b made of it.

Beaufond.

An effort has, however, been made in this direc by Dr. Papin-Ruillier-Beaufond, a pupil of Dr. B from Christopher Bennett to Sales-Girons it took the human mind two hundred years to bridge over this little gap.

505 A. The great advantage of this discovery is that it allows the use of an unlimited number of substances which could not be employed before. Most people may not be aware that when a solution of a solid substance, such, for instance, as salt or sugar in water, is evaporated, particularly by heat, the water is driven off alone without carrying with it any of the solid; this latter remains behind. By means of Dr. Sales-Girons' discovery both the menstruum or solvent (that is, the water) and the dissolved solid, are conveyed together into the lungs and applied to the diseased surfaces. Another advantage in the use of the spray is, that we are no longer under the necessity of heating the substances to be used, and many which would be decomposed by heat thus become available. Besides this, the application of heat or heated liquids to diseased lungs is almost always injurious, not only because it increases the flow of blood to the diseased parts, but also because they are thus made more sensitive to changes of temperature. A great number of experimenters, particularly in France, hastened to take advantage of Dr. Sales-Girons' discovery, and researches were made, particularly as to the degree of penetration of the spray into the lungs by several French physicians, and among them by Réveil, Lecomte, Fermond, Gerdy, Rotureau, and Durand-Fardel. Since Dr. Sales-Girons the apparatuses for pulverizing liquids have been varied and improved, but the fundamental idea which constitutes his invention, that of reducing a liquid into a state of mist, so that it may be breathed into the lung with the air, remains the same.

Its importance.

505 B. Like all new inventions, particularly in medicine, this great step in advance gave rise to hopes which were doomed to disappointment, not because the new method did not in reality possess all the advantages

Mistakes in its application.

[illegible] because few cared to [illegible] for its successful use. [illegible] imagined that now they had [illegible] they pleased into the [illegible] they did put into them.

[illegible] experimentation again [illegible] in those disastrous [illegible] in medicine is [illegible] were those which came [illegible] mineral-waters in general [illegible] results at all—[illegible] and sometimes fatal [illegible] Besides these, a great number [illegible] were [illegible] from pure water [illegible] one of the most [illegible] brought into play, [illegible] (302). It would [illegible] amount of evil thus done. [illegible] will be easily understood [illegible] pointed out already [illegible] effects; next, that the [illegible] structure; that the [illegible] lines the air-tubes and the [illegible] of the lung-cells are not intended [illegible] liquids at all; and lastly, that [illegible] is placed in contact with the [illegible] a process of digestion and [illegible] stomach, but acts immediately [illegible] especially upon the dis-[illegible] or chemical qualities. In [illegible] presence of an offending [illegible] nature induces the [illegible] by which the foreign [illegible] natural channel. In the [illegible] In the normal state they do [illegible] not excrete liquids, but only gas. An offending liquid in the lungs can therefore only be got rid of by producing abnormal excitement and bringing on an increase of cough and expectoration. When this result is obviated, and the cough and expectoration are kept down by the addition of narcotics, the breathing surface may not be less irritated on that account, the breathing process impaired, and the organ itself damaged, perhaps permanently. These reasons will be found amply sufficient to account for most of the failures of the new mode of treatment. After a short-lived popularity its efficacy has come to be regarded as very doubtful, and it may possibly fall into the same neglect as many other valuable inventions. Physicians, like most other people, are very fond of the idea of reaping where they have not sown, and, above all things, hate trouble.

506. Most practitioners who have devoted particular attention to diseases of the respiratory organs have at some time or other tried the use of local applications to the seat of the disease. **My Inhalants.**

Many years ago I carried out a long series of experiments on the subject, some of which are mentioned in my French works ('De la Phthisie,' Paris, 1864, 22, 32, 683). These experiments, however, were altogether confined to volatile substances and gases. The results I attained were never sufficiently constant to form the basis of a general mode of treatment. Since Dr. Sales-Girons' invaluable discovery, however, the possibility of introducing into the lungs any soluble substance in the form of a spray has greatly enlarged the field of experimental research; and five years ago I discovered a series of compounds which act upon the *respiratory surfaces as specific excitants of normal action.* I have now been using them in many hundred cases of all forms of respiratory disease, and think I am not exaggerating in any way when I state that they have, *in all cases, a positive specific* *action against all the congestive or inflammatory states of the breathing apparatus.* My object originally was to discover some therapeutic agent which might promote and facilitate the elimination of tubercular matter already deposited in the lung-tissue. If such a means could be found, it is evident that the limits of the curability of phthisis would be very much enlarged. The hypophosphites by their special action against the diathetic condition prevent the deposit of fresh tubercular matter after the treatment has once begun to act. But, as we have seen (165), the local disease already existing in the lung may be in every possible stage and degree between complete insignificance, so to speak, and such a condition that the lung is quite incapable of cicatrization by the unaided efforts of the organism. It is against this local condition that my stœchiological inhalants exert a direct and specific action.

The inhalants in consumption.

507. Consumptive patients in whom the disease has been allowed to progress without the use of the hypophosphites, those in whom the hypophosphites have been resorted to too late, others again, who have taken them empirically in too large or too prolonged doses, and have thus aggravated the local congestive condition—all such as these usually find immediate relief in the action of the inhalants. The effect is sometimes strongly marked even on the first or second day. All the local symptoms produced by the organic irritation and inflammation, such as cough, expectoration, dyspnœa or breathlessness, are speedily relieved, and the patient speaks of an unusual feeling of comfort and ease. After a variable period, depending upon the state of the lung at the time the treatment is instituted, the relief becomes permanent, extensive infiltrations disappear, large cavities are invested with cicatricial membrane, portions of lung apparently indurated and consolidated beyond hope of recovery, are found to have again become permeable to air, and the whole

breathing power of the patient is very much improved. The inhalants, therefore possess, with regard to the local condition of the lungs in consumption, the same *constant, direct, and specific action* which the hypophosphites have against the general diathesis.

The inhalants in non-tubercular disease.

508. But the action of these stœchiological inhalants is not limited to tubercular disease of the lungs. It applies with an equal degree of efficacy to the whole series of maladies to which the respiratory apparatus is subject, whether these be dependent upon general or local inflammation, such as bronchitis; upon specific conditions, such as syphilitic phthisis and laryngitis; or upon contagious infection, such as diphtheria and hooping-cough. In all these instances the mode of action and the specific effect produced are uniformly the same. But here also, as with the hypophosphites, and as I have pointed out must be the case with all specific action, the efficacy of the treatment is limited by its own conditions of activity, and by the anatomical state of the diseased organs (229, 230, 235). Whenever there is sufficient time for the action to manifest its full effect, whenever the tissues are not anatomically disorganized, recovery is the result. I have now used this treatment with the same uniform success in consumption, bronchitis, pneumonia, pleurisy, syphilitic phthisis, asthma, hay-fever, hooping-cough, laryngitis, whether simple, tubercular, or syphilitic, loss of voice, sore throat, diphtheria, pharyngitis, simple, granular, or specific, and croup. This result, which is the fruit of long years of research, and chemical and physiological experiment, is a new conquest of stœchiological medicine, and a new proof of the truth of the general principles which were the starting point for the discovery of the specific remedy of phthisis.

The inhalants act as specifics.

508 A. Just as seventeen years ago I claimed to have discovered a specific remedy for the tubercular diathesis, so now I deliberately assert that I have discovered *a specific remedy for all inflammatory conditions*

of the respiratory organs. As I stated then, so do I repeat now, this word 'specific' does not mean that the remedy will cure every case under all circumstances, but that ***every one of these diseases may be cured under certain ascertained and scientifically determined conditions.*** So that in all the long and formidable list just enumerated, the physician can almost always master the disease with the new mode of treatment, ***if he only brings the remedy to bear in time.***

Probable reception of this announcement.

509. I know that this announcement will meet with the same reception which greeted my publication of the specific remedy of consumption in 1857. It will be received with incredulity on the part of the public; with vituperation and obloquy, malignant and systematic misrepresentation, on the part of the profession. For this I am fully prepared, but as I have grown older, I intend to adopt a different plan from the one I followed with the hypophosphites. In casting my bread upon the waters then I find that I made a great mistake. I knew from the history of medicine all the persecution inventors had undergone, but I fondly and simply hoped that our time, if not better, was more enlightened, and I determined to try the experiment for myself. I then said, 'Whether the course I have thus followed has been the best calculated to hasten the general adoption of the hypophosphites by the medical profession time alone can determine. I shall for my own part, however, have at least the satisfaction of knowing that from no one sufferer will this great boon have been withheld, from any fault or for any benefit of mine. Judging, however, from the experience of the past, I am afraid it will not be till at least two generations of the medical profession shall have passed away, that my discovery will rise above the mists of controversy and prejudice into the serene region of scientific truth.' (Letter to the Editor of the 'New York Tribune,' on Consumption, London, 1859.) I now

find, at the end of seventeen years, that my misgivings have proved but too true. The hypophosphites, by the mere strength of their immediate therapeutical effects, of the results they produce in the hands even of the grossest empiricism, have forced their way, through all opposition, into general use, and have taken by storm the place that has been given them grudgingly and unwillingly in the Pharmacopœias of Great Britain and the United States. But they are still far from being administered scientifically, and, although known and constantly used by the leaders of the profession, their real merits are carefully kept back from the rank and file, by whom the community at large are necessarily guided. Hence it follows that a discovery, which, far from being a mere empirical and happy guess, is founded upon the widest basis of scientific data ever brought forward in pathology or therapeutics, which extends its ramifications throughout the whole field of pathology, and which at the same time, is so simple, that any person of education may master its general bearings, instead of becoming a household word like vaccination, and enabling not only every practitioner but every head of a family to battle successfully against one of the greatest foes of the human race, has been trampled under foot and half smothered in the mire of controversy and dishonest misrepresentation. Besides all that has been said in the preceding chapter, I could fill pages with proofs of this assertion.

The treatment the author has received for his first discovery.

Now it is neither just nor good that such things be. If this book has not altogether failed in proving what I intended, the reader who has gone through it carefully, must be satisfied that the truth of my discovery of the specific action of the hypophosphites in phthisis, is supported by a large amount of independent professional testimony, and that every consideration of public policy and humanity requires that this question should receive, as speedily as possible, a positive and definite solution.

I have shown why that will not be (493). For seventeen years I have been fighting a battle almost single-handed, not only against the indifference and ignorance of the public, but against the prejudice, frequently the avowed, almost always the secret, hostility of most of my professional brethren. During that time my name has been and still is pirated with impunity, my invention has been plagiarized in every possible manner, often to the great damage of the public, my ideas have become the prey of every ignorant and envious caviller, fortunes have been made out of my discovery, but not by me, it is used in secret by those who revile it in public, and when, after a life spent in studious labour abroad, which has earned for me the respect even of my adversaries there, I return home, I find the profession banded against me as one man, and ready to proceed to any extremities of extra-legal, professional, or social persecution. I do not state this now, at the eleventh hour, to ask for sympathy; had I cared for that I should have asked for it sooner. The question at issue is of far more importance to society than it can ever be to myself. Even should the triumph, by an impossibility, be complete during my lifetime, it will come too late to afford anything more than a very small degree of complacent satisfaction. But I absolutely refuse to go through an ordeal of this kind a second time. Seventeen years is a short time in the life of a discovery, but a long time in the life of one man, and I have not seventeen more such to give. I do not see upon what principle of justice, expediency, or public policy, inventors should be compelled to involve themselves in an endless tempest of controversy. There is no necessary connection between the intellectual qualifications required to open up some new spring of knowledge and the gladiatorial aptitude which enables a man to hold his own against all comers. For my own part, I have had enough of such controversy for one lifetime. But the history of my discovery from its origin, and above all my treatment at the hands of the profession, in this country, show me that there is still a duty which it is incumbent upon me, as a successful discoverer, to fulfil.

The fate of inventors.

509 A. It has been the fate of most inventors to make one discovery and to spend the rest of their lives in a fruitless endeavour to get it acknowledged. Instead of continuing to employ either the special aptitude they had acquired, or the special data they had amassed in pushing still further their conquests, most of them have been compelled to limit themselves to one single effort. Society has seldom been aware of this fact. It has supposed that each inventor had given all he could produce, and however it may have affected to grieve at having generally recognized his merit too late, it has easily comforted itself with the conviction that it had lost nothing after all, that it had rather made a good bargain, by getting for nothing all that it could expect from him, and that, if anything was still due, it made ample atonement for neglect and injustice to the living by the idiotic farce of posthumous honours to the dead. In my own case I am glad to think that, although there has been a great amount of controversy with regard to the hypophosphites, it has been very much on one side. I have let them fight their own way, and have busied myself most with working out new applications of the same principle which led me to them.

509 B. As far as the specific remedy for the *tubercular diathesis* is concerned, the whole question is embodied in this book. Nothing either against or for the validity of my discovery remains to be said, and yet its practical consequences, the 'stamping out' of consumption, the making this great scourge as insignificant as small-pox, is perhaps as far off as ever. If I have made mention of the inhalants, it was to give another and practical proof of the value of stœchiological medicine; and, because I consider it my duty to show to those *whom it may personally concern*

that, even when the sphere of efficacy of the hypophosphites is overpassed, beyond them lie means available still. They are not the question now at issue.

The inhalants will not be published.

509 C. I have not stated, nor do I intend to state, what these stœchiological inhalants are. I have come to this determination very sorrowfully and reluctantly, but resolutely and only after mature consideration. I think that in so doing I am acting for the best, not only for myself, but in discharge of the obligations which I, as an inventor, owe to society.

Reason why.

The point which I want to raise is not the value of what some will, of course, term a drug, just as they did the hypophosphites. It is an attempt to put into a practical form, which shall bring it home personally and tangibly to, at least, some portion of the public, the whole question of the rights and the wrongs of inventors, and the reciprocal claims of the public and inventors upon one another.

509 D. Opinions concerning inventors are in such a confused and unsatisfactory condition that I cannot expect this decision of mine to pass unchallenged. It will, no doubt, subject me to much misrepresentation and obloquy, though certainly not to greater than I have already incurred by divulging my discovery of the remedial action of the hypophosphites. To a few independent minds the following reasons will, perhaps, give a different aspect to the matter.

Treatment of inventors by the public.

510. People have generally a very low opinion of inventors. To be an inventor is pretty much the same as to be a dreamer, a schemer, or an impostor. Not only is there never any reward for honest, devoted, though unsuccessful labour for the public good, but neither interest nor sympathy for failure. There is no tolerance or charity for inventors, as if it were more honourable to do nothing than to attempt something and to fail. The infinite Creative Power scatters with boundless profusion

the germs of life, most of which are doomed to perish and seem to have been sown in vain; man in his greed and self-conceit looks upon failure as a disgrace and as worse than cowardice and sloth. If there is no sympathy for those who fail, there is little gratitude for those who succeed. Not to go beyond the range of medical discovery: even when great inventions have become fully recognized and acknowledged on all hands, the public is perfectly indifferent to the fate of the discoverers, or of those who were near and dear to them. Only a few years ago the last surviving relative of the great Jenner, the discoverer of vaccination, was in deep distress. A subscription started in his favour hardly produced a few pounds. Of the many millions who, but for Jenner's discovery, would long since have been rotting in their graves, not a hundred came forward to testify their gratitude. Had Jenner but slaughtered one ten-millionth part of the men his discovery has saved, his relative would have been in the enjoyment of affluence, and ranked with the proudest in the land. The great boon of insensibility to pain by the use of anæsthetics (the laughing gas, ether, or chloroform) has carried comfort and courage to sufferers all over the world. The discoverers of etherization, Morton and Jackson, were voted 100,000 dollars by the Congress of the United States, which, to the lasting disgrace of their country, they never received. Jackson was living a short time since in obscurity; Morton fell into such distress that he committed suicide. Wells, the first who applied the laughing gas to the suppression of pain during an operation (the extraction of a tooth), afterwards, out of despair or want, died by his own hand. Public opinion is so utterly gone astray, or, to speak plainly, is warped with such shameless dishonesty upon this subject, that some time back a reviewer had the indecency to state that he was rejoiced to think neither Morton nor Jackson had ever received any reward for their discovery, because they had *attempted* to keep it secret. Be it added that neither of them belonged to the medical profession—Jackson was a professor of chemistry, and Morton a dentist. If I chose to travel out of the domain of medicine, instances, to any number, of the same kind might be quoted from the whole range of science and industry. The history of the industrial progress of this century is but one long record of the shameless and bestial ingratitude of the public towards those who have served it best.

Mistaken ideas concerning inventions.

510 A. While such is the morality of the public with regard to inventors, as shown by the treatment they receive, the ideas concerning inventions are not more rational or satisfactory. Most people seem to think that inventions can actually be made to order, and that if Government would only offer a sufficient reward, anything that is wanted may be got by asking for it. This is a complete mistake. No inventor can tell the hour or the day when he may succeed. Another mistake is as to the merit and value of invention. Only a short time ago a leading article in one of the principal medical journals brought forward the certainly original idea, that society at large was under no obligation to an inventor; that public gratitude, if due to any one, belonged to those who propagated the discovery, not to the man without whom there would have been nothing to propagate. Upon this principle, in supplying a town with water, the only thing required is to lay down the pipes; the water itself is of no account. Another error is that inventions are a natural growth of the human intellect, and must inevitably occur. The history of every particular science, and of every phase of its development, shows that this is not true, that each step in advance is due to the personal effort, sometimes to the persevering labour, extending over long years, of a few and mostly of some one single individual. History teaches that if a certain stage of development is always in-

dispensable for each new and definite advance, this advance may be delayed for years, for several generations, simply because the proper mind had not come forward to pick up and work out the data which existed, but which were lying neglected or unknown. Another mistake proceeds from the idea that inventions are usually the result of chance, of some lucky accident, which the inventor merely takes advantage of, or draws, like the prize in a lottery. Nothing can be more erroneous. No doubt the inventor often meets with other results than he expected, but that is simply because he was already on the search. None find but those who seek.

Loss to the public on this account.

510 B. It is impossible to estimate the number or the value of discoveries which have been lost to the world owing to the degraded stage of intellectual development, in which public opinion lies with regard to this matter. A history of the inventions thus lost would be alone sufficient to prove that there is, perhaps, no question superior in real importance to this. I know of several valuable industrial discoveries which are kept secret, because their inventors are aware that the present protection of the law is only a delusion and a snare, but I shall confine myself to two medical instances:—

Medical instances.

A few years ago Baron Heurteloup, one of the most successful surgeons in Paris, offered, shortly before his death, to divulge his process for the treatment of urinary diseases, upon condition that the Academy should appoint a committee to examine it first, and that if the judgment were favourable, he would divulge it afterwards. He knew, as a notorious fact, that if he made it public first it would never be reported upon. This the Academy refused, as contrary to etiquette, and the secret of Baron Heurteloup's treatment died with him. How much the many sufferers from this class of diseases, when they learn this story, must rejoice at the triumph of etiquette.

One of the most foul and loathsome of all diseases, [illegible] It may be, it was [illegible] All we know is that this in- [illegible] to the misery and sufferings of mankind might have been thrown forty years ago, and was allowed to lapse back into that utter darkness of infinite ignorance which hems us in on every side. The voucher for this statement is my friend and master Philippe Ricord, the first living authority on the subject ('Manuel pratique des Maladies Vénériennes,' Paris, 1838, p. 170).

The future of invention.

511. Most scientific inventions, not of a mechanical kind, have been hitherto made by the professorial class, men engaged in teaching science, and holding appointments of a public kind, perhaps having at their disposal means supplied by the public, such as laboratories, etc. Hence it has followed that, inasmuch as they were public servants, both they themselves and society have come to consider that the latter had a kind of paramount right to their inventions, and that they were bound to make what they discovered common property. With the general diffusion of scientific knowledge inventions will no longer be confined to the class of teachers or government officials, and this reasoning will no longer be applicable. The kind of men by whom discoveries may be made will increase in number not only owing to the general diffusion of scientific knowledge, but also because the process of invention will get to be better understood.

It is evidently a matter which very nearly concerns the public weal that the class of men who make inventions and the kind of labour by which discoveries are arrived at should be encouraged by every possible means. If the labour which produces a limited result is deserving of reward, how much more so is that labour, which produces an unlimited number of results, not only in the present, but for all time to come.

Almost all the wonderful improvement, called civilization, which has taken place in Europe within the last two centuries, the immense accumulation of wealth, the vast diffusion of creature comforts, and the almost total absence of positive daily want, such as is so common in the savage state—all these can be distinctly traced to the efforts of a limited number of individuals, who for the most part have received very inadequate reward, or no reward at all. Inventors have made the world what it is, and if they only shut their hands the world would stand still.

Right of intellectual property.

512. That this is a very unsatisfactory state of things no one, I should think, would be inclined to deny. How is it to be remedied? By inventors themselves. The mass of mankind are too indolent, too ignorant, too busy with their own immediate concerns to enter into the details of each individual case.

The law must be *forced* to recognize the 'right of intellectual property,' and so secure to discoverers in science a remuneration adequate to the value of their inventions. Just as no person can now use a patented mechanical contrivance without paying tribute to the inventor, so no one should be allowed to make use of the 'thoughts' of another, that is, the *work of his brain, to produce a material and money-value result*, without the consent of the inventor, or without paying him for such use. When a man airs his ideas the law should protect him against robbery, just as it does when he airs his clothes. Although the present absurd and very incomplete patent laws have only been in existence for comparatively a short time they have given an immense impulse to all discoveries protected by them. But in all branches of knowledge which are unprotected invention has been very fitful, irregular, and languid. This is particularly the case in medicine. As the Editor of a leading Medical Journal aptly remarked a few years ago: 'People wonder that there should be so few improvements in medicine. The only wonder is that there should be any improvement at all.'

There can be no doubt that if due encouragement were extended to inventors in medical science, not by giving them a monopoly in their discoveries, as is done by the patent laws, which would be absurd, but by securing for them an adequate reward, there are a great number of improvements which would be perfected and brought forward by their authors, which are now kept back, or are not fully worked out. One of the greatest advantages attending this acknowledgment of a 'right of intellectual property' would be that inventions would be discussed much more upon their own merits than at present. One whole class of opponents would be got rid of altogether, the most pertinacious and the most numerous, those who cry down a discovery because they want to appropriate it or to counterfeit it. If taking a discovery without paying for it were as much a felony as stealing an old coat, there would no longer be the same incentive of personal and pecuniary interest in nine-tenths of those who are now opposed to any new invention. No doubt the base feeling of envy, which is so common to all of us, the impatience against all assumption of superiority, whether genuine or fictitious, which we are so apt to feel, would still exist, and be quite sufficient to produce any useful amount of criticism and negation. But the throng of persecutors, who hound their victim to the death, would be very much thinned, if they knew they would not be allowed to share his spoils among themselves.

It is very important to future progress that these ideas should be generally admitted as speedily as possible. The world is just now at a turning point. Science is brimful of phenomena, waiting for use and application; and just in proportion as invention is encouraged or not, will unexpected and hitherto impossible results be speedily obtained, or be put off perhaps for several generations.

There is little chance of this view being realized for a long time to come. It is pregnant with such consequences that it will, perhaps, be the most momentous revolution in the history of the world. It will be a greater step in civilization than the change from the nomadic to the fixed state by the institution of property in land. The habitable surface of the earth is limited, the knowable unknown is probably boundless. This idea is far above the range of the average intellect of the present day, and even men of science in general will not come into it. It is true that they are themselves far from satisfied with the place they fill or the influence they hold in society. 'In the primeval forests of Brazil,' says Dr. Du Bois Reymond, himself an inventor, in an address to the Berlin Academy ('Monatsbericht,' March, 1874), 'may frequently be seen a murderous climbing plant, the sipo-matador, still standing erect, a hollow scaffold over the decaying stem which has been strangled by its treacherous embrace. In no long time, however, it pays the penalty of ingratitude with its own life. So would the rich climbing growth of industry about the stem of science survive but a short time the fall of the supporting plant, from which, in ignorance of its own conditions of life, it had cut off the supply of nutritious sap.'

But though aware of the injustice done to them as a class, men of science are for the most part indifferent or hostile to justice being done to the initiators of scientific action, the salt without which they themselves would lose their saltness. This is especially true of the medical profession. Inventors are a distinct and, to the mass of scientific men, an obnoxious class, though by the public they are all confounded together. A man of science is no more, on that account, to be deemed an inventor than a pig is an elephant because both have certain zoological characters in common and browze in the same forest.

The remedy must come from the inventors themselves. Hardly a century ago men of letters were supposed to write for glory alone. The profits were for other people. They have altered all this to the great benefit both of themselves and the public. No one wants to go back to the days of condescending patrons and starving and humble authors. Let inventors do likewise; let them sternly insist upon their rights. Let them teach society the immorality of the injustice done to inventors, by letting it feel that injustice recoil upon itself. They have the power, and they must make it felt, undeterred by the clamour and whining cant about humanity of the Intellectual Communists, who are as sincere, in their zeal for it, as their political prototypes. To every inventor I would say:—

> Καὶ σὺ, φίλος, (μάλα γὰρ σ' ὁρόω καλόν τε μέγα τι)
> Ἄλκιμος ἔσσ', ἵνα τις σε καὶ ὀψιγόνων ἐῢ εἴπῃ.

When an inventor has made a discovery of value, and sees that instead of bringing him some compensation for his trouble and labour, some short interval of quiet after perhaps years of thoughtful days and sleepless nights, it is doomed to fall a prey to the envious, the ignorant, or the dishonest, he must place the bare fact of his discovery upon record, and let it go back with him to the limbo from which he brought it. He must remember that if he has duties as a member of society, he is also specially a member of the noble army of inventors, and that whatever tends to encourage their efforts tends a thousand times more to the permanent advantage of the race. This is an obligation particularly incumbent upon such as have already proved themselves to be successful inventors, as their word will be of much greater weight. By this means inventors will, in time, wring from the hopes and the fears of society what they will ask for in vain at the hands of its gratitude or its justice. This progress, like all other, will only be accomplished at the cost of a certain amount of suffering, but inventors must not have a monopoly of it; let society take its fair share.

Of all the different branches of science none perhaps is able to teach this lesson with greater efficacy than that of medicine. Here is no need for large outlay or for long and laborious preparations; a mere idea adequately verified has only to be set upon a hill-top for all the world to be enlightened thereby. I want therefore to set an example to those inventors who come after me. Hereafter, when the truth of the efficacy of the hypophosphites shall be acknowledged by the whole world, my word will perhaps be believed with regard to the reality of a second discovery of perhaps greater value which came and has gone. If this should be the initiation of an action, which shall end in establishing the 'right of intellect,' that is, of real and true liberty of thought, the right of the most sacred and the most useful of all labour, *the absolute and indefeasible right which every brain-worker has to the produce of his brain, just as the hand-worker has to the produce of his hands*, I shall perhaps have done a greater thing than in showing the way to mend any number of broken lungs.

If I should be told that I have no right to act in this way, that whatever results I may have arrived at are merely the consequences of former intellectual action, of which I am but the recipient, I shall say that the right is proved by the power. If I should be told that I have no moral claim to keep such things to myself, and that the opinion of society condemns me, I shall be satisfied with sheltering myself under the sentiments of an able lawyer, a deep thinker, and a hard worker and inventor: I mean George Ticknor Curtis, John Stuart Mill, and David Brewster.

Mr. Ticknor Curtis, in his 'Treatise on Patents,' says: 'As the exercise of the invention is wholly within the control of him who has made it, who may confine his secret entirely within his own breast, it is apparent that his consent to make it known and available to others, and finally to surrender it to the public, becomes a valuable consideration, for which, upon the principles of natural justice, he is entitled to receive compensation in some form from the public, to whom that consideration passes.

'Whether we regard the knowledge remaining for the present in the exclusive control of him whose intellectual production it is as property, or as a possession of ideas to which some other term might be more appropriate, it is still a possession, of which the owner cannot by any rule of natural justice be deprived without his consent. In this view it may, as it seems to me, justly be termed property; for although in political economy, and in common speech, material possessions or the rights growing out of them are the objects generally included under that term, yet no one will question that ideas constitute, in ethical contemplation, a portion of a man's possessions entirely under his own control; and in the case of useful inventions, or of written thought, there is to be added to the power of control the further economical fact, that other men will part with valuable possessions of all kinds in order to obtain that invention or writing in exchange.

'I do not hesitate to affirm that in natural justice—the ethics of jurisprudence, by which civil rights are to be examined apart from all positive law, but on which positive law is usually founded—the intellectual conception of an inventor, or a writer, constitutes a valuable possession, capable of being appreciated as a consideration when it passes by his voluntary grant into the possession of another. If by the same voluntary grant this possession is bestowed upon the public, the logical justice of compensation in some form will appear at once by supposing the benefit to have been conferred exclusively upon any one of the mass of individuals who form in the aggregate the moral entity termed the public.'—Curtis on 'Patents,' Preliminary Observations, p. xix. (Boston, 1867).

John Stuart Mill says: 'It is generally admitted that the present patent laws need much improvement; but in this case, as well as in the closely analogous one of copyright, *it would be a gross immorality in the law to set everybody free to the use of a person's work without his consent*, and without giving him an equivalent. I have seen with real alarm several recent attempts in quarters carrying some authority to impugn the principle of patents altogether, attempts which, if practically successful, *would enthrone free stealing under the prostituted name of free trade*, and make the men of brains still more than at present the needy retainers and dependents of the men of money-bags.'—'Principles of Political Economy,' Sixth Edition, vol. ii. pp. 551, 552.

Sir David Brewster says: 'Not only has the Legislature neglected the interests of inventors, and virtually those of the public, but some of them, even men of high position, have, under the influence of evil counsels, thrown out the idea that patent rights, and, of course, copyrights, should be altogether abolished, and that the idle and the ignorant, the rich manufacturer and the wealthy capitalist, should reap the harvest of which others had sown the seed, and seize the property which mental toil had purchased, and a life-long study had made useful to society. *Such a doctrine might have been expected from the wildest socialism*, and if carried into effect, would justify the seizure of every other property by those who have been robbed of their own. It is some consolation, however, to those who have been bent under a life-toil of midnight labour, or crushed beneath the heart-breaking sacrifices by which eminence in science and the arts is attained, that the heartless opinions which we condemn are entertained but by few; and it ought to be a greater consolation to the friends of social order that such opinions have no chance of debasing our Statute Book. If the violation of the great charter of English liberty would justify the citizen in renouncing his allegiance to the Crown, *the confiscation of man's intellectual property, given him by God, and consecrated by reason, would justify that extreme resistance which even loyalty is sometimes compelled to oppose to injustice.*'—Quoted from the 'North British Review' in Dirck's 'Inventors and Inventions,' p. 124, London, 1867.

APPENDIX I.

PROOFS IN SUPPORT OF CHAPTER III.

513. Two of my adversaries, Dr. Quain and Dr. Risdon Bennett, after having quoted paragraphs 48 and 49, add, 'That the preceding propositions ought to be looked upon only as theoretical speculations which are not supported by any chemical or physiological observation.' (The 'Lancet,' March 17, 1860.) It will be seen by what follows that, on the contrary, there is not a single one amongst them which is not supported by either chemical or physiological proof, if by this last term we understand, as we ought—therapeutical experiment. Every therapeutical experiment, properly interpreted, is, in fact, at the same time a physiological one. My fundamental propositions here follow *seriatim*, with the proof in support of each.

First proposition.—*Tuberculosis is a general disease, a diathesis.*—This proposition, which is admitted by most pathologists, springs directly from the fact that tuberculosis does not spare any tissue or any organ. As Rokitansky says, 'Whenever there is a capillary network, there is a possibility of the formation of a tubercular deposit.' ('A Manual of Pathological Anatomy,' by Carl Rokitansky, published by the Sydenham Society, vol. i. pp. 7, 305) . . . . 'Tubercle, like cancer, spares no tissue. Every organ can be the seat of it. Thus tubercle has been found in the following organs: The lung, the intestinal canal, the lymphatic glands, the larynx, the serous membranes, the pia mater, the brain, the spleen, the kidneys, the surrenal capsules, the liver, the bones and the periosteum, the uterus and the fallopian tubes, the testicles, the prostate, the seminal vesicles, the spinal marrow, the striate muscles, the thymus. They have been found also, although very rarely, in the salivary glands, the ovaries, the internal membrane of the blood-vessels, the æsophagus and the vagina. The epidermic and cartilaginous productions are the only ones which are not liable to tuberculosis. The tissues of new formation are equally subject to it.' —Rokitansky, *loc. cit.* p. 321, and 'Ancell on Tuberculosis,' p. 359.

Second proposition.—*Tuberculosis can only depend on the disturbance of some one of the primordial functions of the system, and in view of the connection which exists between all parts of the constitution, this disturbance must have as its starting-point, or at least as an essential condition, a modification of hæmatosis.*

This proposition following directly from the preceding one, does not appear to me to require proof. Most of those authors who have admitted the one have equally been led to adopt the other. Lebert ('Traité des Maladies scrofuleuses,' p. 44) says, 'The hypothesis that the final cause of tubercle resides in the blood is highly probable.' So Andral has remarked, 'Physiology leads us to the conclusion that every alteration of the solids must be followed by an alteration of the blood, just as every modification of the blood must spring from a modification of the solids.'—(Andral Anatomie pathologique,' tom. i. p. 528.)

Besides, it is proved by direct observation; for, as the same author says, 'Persons in whom tuberculosis of the lung is beginning, present in their blood that particular modification of composition which appertains to weak constitutions; they are really at the commencement of anæmia, and their blood has become like that of patients who have been subjected to bleeding.'—'Essai d'Hématologie pathologique,' Paris, 1843, p. 171.

Third proposition.—*The modifications which are found in the organic elements of the blood offer nothing fixed or specially characteristic of tuberculosis.*

Andral and Gavarret have established that the blood of tuberculous patients shows two kinds of modifications: an increase of the fibrin and a decrease of the sum total of the globules. The first is only found in cases attended with inflammatory complication, and the second has nothing special to phthisis. Thus, in a patient suffering from tubercular meningitis, the fibrin was found to be within its physiological limits. 'This proves,' adds Andral, 'that at its outset, whatever may be its rapidity and its extent, tuberculization does not produce an increase of fibrin in the blood. The study of the state of the blood in pulmonary tuberculosis leads to the same conclusion, since in nine samples of blood drawn from six patients suffering from crude tubercles, in seven instances the fibrin was found in its normal quantity. Twice it exceeded the physiological standard, but in both cases there was inflammatory complication.'—Ibid. pp. 168, 169.

With regard to the globules, the same pathologist says: 'At the outset of pulmonary tuberculization, when its existence can hardly be detected by auscultation, the globules are already found to be deficient. In every case of this kind I have found them below their physiological mean, 127; their highest figure was 122, their lowest 99 (in a patient whose serous membranes as well as the lungs were studded with numerous tubercles), and they usually oscillated between 120 and 100, generally nearer the latter figure. The condition of the blood which coincides with the commencement of pulmonary phthisis, and which probably precedes it, is that general state which is found in all cases where, from some cause or other, the vital forces have lost some of their energy. It is unnecessary to point out how completely these results of chemical analysis agree with those of clinical observation. We all know the etiolation, loss of colour, and general weakness shown by most consumptives at the outset of their disease. When an attack of pulmonary phthisis is impending, many young girls become so weak and pale, and at the same time show so few local symptoms, that their disease is usually mistaken for chlorosis, just as cases of chlorosis, complicated with bronchitis or mere nervous cough, sometimes perplex the most consummate observers by making them fear development of tubercle. There is, therefore, in all cases of pulmonary phthisis at their outset a certain degree of anæmia. *But does it follow that this impoverishment of the blood is sufficient to produce tubercle? Undoubtedly not; for if this were the case, we should find a much larger proportion of consumptives than we do among chlorotics.* I do not think that chlorotics become tubercular more frequently than those who are not so.'—'Essai d'Hématologie pathologique,' pp. 170, 171.

The researches of Becquerel and Rodier do not accord with those of Andral and Gavarret. According to them, the blood of consumptives shows a change in the proportion of the different organic elements. They found an increase of phosphorized fat and of cholesterine, and a decrease of saponifiable fat.—'Recherches sur la Composition du Sang dans l'État de Santé et l'État de Maladie,' Paris, 1844, p. 99.

But on examining the details of their analyses they will be found in no way to invalidate my proposition.

First, as to the phosphorized fat, they have themselves since admitted that they had made a mistake, and that the substance which they had designated as phosphorized fat contained no phosphorus at all.—Becquerel, 'Chimie pathologique,' Paris, 1846, p. 64.

The increase of cholesterine is not special to tuberculosis, as they themselves found it to co-exist with other pathological conditions, such as simple jaundice (Becquerel and Rodier, 'Recherches sur le Sang,' etc. p. 60), abstinence (p. 25), and old age (pp. 24, 121). The decrease of the saponifiable fat was, they had thought, greater in phthisis than in any other disease (p. 99), and they had drawn special attention to this point (pp. 101, 103). An attentive examination of their analyses does not confirm this view. Their results are far from agreeing. In the cases of five men they found a considerable decrease of soap, which was only half (0·564) (p. 98) of the normal mean (1·204) (p. 23). This figure was only found after the *third* bleeding. At the first bleeding the blood contained 0·809 of soap, and at the second bleeding 0·766, both which are superior to the physiological minimum (0·700) (p. 23); so that the decrease of the fatty principle ought to be attributed to the weakness of the whole system, and to the want of general nutrition, rather than to the tubercular diathesis itself. This view is confirmed by what they observed in the cases of four women suffering from tubercles, but who were in a less advanced stage of the disease than the men. In these cases they found as a mean figure for the soap 1·011 (p. 102), which differs little from their physiological mean (1·046) (p. 27), which is much higher than their physiological minimum (0.725), and which is higher than the mean figure they obtained in acute diseases in general (0.900) (p. 35), in the phlegmasiæ (·914) (p. 53), and above all in chlorosis, where in six cases the mean was 0·888 (p. 92), while in a seventh case it even fell to 0·694 (p. 95).

FOURTH PROPOSITION.—*The phenomena of this disease compared with those of some other dyscrasiæ, above all with those of chlorosis, seem attributable to a loss or decrease rather than to an increase of some essential elements.*

The weakness and prostration which almost always precede and accompany an attack of tuberculosis is a symptom which has struck almost every clinical observer of repute (315). Thus, to give only two examples:—

'All forms of phthisis,' says Graves, 'may be referred to a common origin, that state of constitutional weakness which has been called the scrofulous habit.'—Graves, 'Lectures on the Practice of Medicine,' Second edition, Dublin, 1848, vol. ii. p. 90.

'A decrease in the quantity of blood globules,' says Andral, 'noticeable during the very first stage of phthisis, is not the cause of tuberculization, but to me is a certain sign that this disease takes its origin in a *notable weakening* of the constitution. This concurs with the other signs furnished by the clinical observation of all ages, in pointing out to us the direction we should take in the choice of our therapeutic means.'—'Essai d'Hématologie pathologique,' p. 172.

FIFTH PROPOSITION.—*We are already in possession of a large number of facts as to the influence upon the system of most of the inorganic principles. Thus, iron, sulphur, either in the form of a sulphide or sulphate, the chlorides, the alkalis, are in daily use; all or nearly all have been tried in the treatment of tuberculosis, and no one of them has presented any sufficiently marked or sufficiently constant effects to justify us in attributing to it any real influence upon the disease.*

A. Iron was long recommended against phthisis by a great number of physicians, among whom are the following:—Paracelsus (1541), Morton (1619), Poterius (1622), Hoffmann (1740), Pierre Dessault, Griffith (1776), Raulin (1784), Quarin (1786), Senter (1792), Willan (1801), Hamilton (1805), Russel (1808), Shearman (1810), Young (1815), and in our own time, Dupasquier (1836), Simon (1843), Duelmar (1852), and Bonarden (1853).

B. Sulphur had already been recommended by Dioscorides, Celsus, Galen, and later by Paracelsus, Forest, Schenk (1609), Poterius, Dubois (Sylvius) (1671), Willis (1675), Sydenham, Morton, Stahl, Musgrave (1707), Barry (1727), Clapier (1763), Sirus (1773), Mudge (1779), Gratteloup (1779), Busch (1801), White (1803), Lloyd (1804), Bayle (1811), Jobart (1811), Armstrong (1818), and Hermann (1827).

It would be tedious to enumerate the authors who have recommended the employment of *mineral sulphurous waters.*

C. Chlorides.—Salt meats had already been recommended by Hippocrates, later by Aurelianus, later still by Salvadori, in 1787.

Chloride of sodium, the utility of which in modern times Latour (1840) supposed he had rediscovered, had been used and recommended by De Meza in 1792, by Rush in 1793, and by Trotter in 1804.

The *chloride of lime* (hypochlorite of lime) was recommended by Herzog (1832), and by Schlesier (1837).

Chloride of calcium was given by Cless (1832), Groh (1833), and Cohen (1834).

Chlorine by Pagenstecher (1827), Gannal (1827), Cottereau and Chevallier (1833), Jolly and Roche.

D. Alkalis.—*Chlorhydrate of ammonia* was employed by Thilenius (1789), by Rademacher, and by Aucclang (1832).

Carbonate of potash and potash were administered as antitubercular remedies by Pascal (1839), and by Campbell (1844).

Spalding and Barker in 1802, and Bayle in 1811, had already prescribed alkalis.—See 'A Practical and Historical Treatise on Consumptive Diseases,' by Thomas Young, London, 1815.

Thus each of the propositions which were taken as a starting-point for the establishment of my hypothesis rests upon a series of the best established facts in medicine; and Drs. Quain and Risdon Bennett in asserting that they were mere conjectures, show how negligently and inconsiderately things are done in medicine even by those who by their status should feel bound to set an example to the rest (234).

APPENDIX II.

514. As a medical curiosity, the following is a list of nearly four hundred medicinal substances which at some time or other have been employed or recommended against phthisis. The present medical school holds that the true science of medicine consists in the collecting of facts. If such be the case, it would be curious to enquire what principle is to guide the choice of the practitioner among the following farrago. Must he try them one after the other, count the testimonies in favour of each, select the least known, or follow the newest fashion? Some adept of the present school might surely answer this question. Only he must remember that as four per cent. of consumptives may outlive the disease either with or without any kind of treatment, any remedy which has been employed in twenty-five cases may have seemed to cure one, and thus be able to allege at least one fact in favour of its efficacy. The list might be still further enlarged, but it looks very respectable as it stands, and gives an adequate idea of the therapeutical resources of medicine as at present understood. For most of the names in the subjoined list I am indebted to 'A Practical and Historical Treatise on Consumptive Diseases' by Thomas Young, London, 1815, but I have largely increased the number, collected them together, and reduced them into a tabular form.

Ablutions
Abstinence
Acetate of iron
— — lead
— — potash
Acids in general
—, sulphurous
—, carbonic
—, hydrochloric
—, nitric
—, phosphoric
—, oxalic
—, Prussic
—, vegetable
Aconite
Agaric
Air, sea
—, of stables
Air, mountain
—, of coal-mines
—, of boiling-houses (West Indies)
Alkalis in general
Aloes
Alum
Amalgam of gold
Almonds, bitter
Ambergris
Ammonia, chlorhydrate of
—, sulphhydrate of
Angostura bark
Aniseed
Antimony
Antiphlogistics
Antiseptics
Arnica
Arsenic

Arsenite of potash
Arseniate of soda or potash
Arum triphyllum
Assafœtida
Asphaltum
Astringents in general
Alcohol
Bitters in general
Baths in general
—, mineral, of all kinds
—, sea
—, earth
Balsams of all kinds
—, tolu
—, Peruvian
—, Mecca
Belladonna
Benzoin
Betony
Butter
Broth, chicken
Brandy
Bleedings, frequent
Blood, hot from the animal
Buffalo marrow
Barley
Birds, small
Bark (Cinchona)
Blisters
Cough remedies of all kinds
Coffee
Catechu
Calaguala
Calomel
Camomile
Camphor
Cantharides
Capillus Veneris
Carbonate of ammonia
— — potash
Cardamoms
Cassia
Cathartics in general
—, resinoid
Caustics
Celery
Change of residence
Charcoal
Coal
Chlorine
Chloride of ammonium
— — barium
— — lime
— — potassium
— — sodium
Citrate of potash
Corrosive sublimate
Cress
Cress, water
Cobalt
Colocynth
Calumba
Cucumbers
Copaiba
Cistus canadensis
Crabs
Currants, dried
Climate of every kind, from the Torrid to the Frigid Zone
—, Italy
—, Lucca
—, Naples
—, Rome
—, Lisbon
—, Madeira
—, Malta
—, Malaga
—, Minorca
—, Montpelier
—, Nice
—, Nismes
—, Hyères
—, Mentone
—, Cannes
—, Pau
—, France, South
—, Egypt
—, Sicily
—, Spain, South
—, Valentia
—, England, South and West
—, Torquay
—, Penzance
—, Bournemouth
—, Isle of Wight
—, Channel Islands
—, United States, South and West
—, South Carolina
—, Florida
—, Minnesota
—, Arkansas
—, West Indies
—, Jamaica
—, Havannah
—, Santa Cruz
—, Mexico (Table Land)
—, Andes of Peru
—, New Zealand
—, Australia
—, Japan
—, every place except the one the patient is in (220, 423—439)
Dandelion
Declamation
Digitalis
Diuretics

Dulcamara
Exercise, carriage
—, violent
—, special, of the lungs
Elaterium
Emetics in general
Ether
Eupatorium perfoliatum
Excrement, serpents'
—, pigeons'. See Uric Acid
Expectorants in general
Eggs, raw or cooked
Fruits of all kinds
Fumigations in general
Fats of different kinds
Fat, mutton
—, buffalo
—, marrow
—, mutton, boiled in milk
—, deer
— of the field-mouse, to be rubbed in
Frogs
Frankincense
Fish
Garlic
Gin
Grog
Grape-cure
Guiacum
Gases
Gas, hydrogen
—, carburetted hydrogen
—, oxygen
—, protoxide of nitrogen
—, antimoniated hydrogen
—, hydro-sulphuric
Ginseng
Gums of various kinds
Gum, Arabic
—, tragacanth
—, ammoniac
—, mastic
Guano
Hemlock
Helenium autumnale
Helicine (active principle of snails)
Hellebore
Hematite
Hermodactyl
Hops
Hypericum (St. John's wort)
Hyssop
Hyoscyamus
Honey
Issues
Iron, all preparations of
Ice
Inhalations of vapours
Inhalations, of all kinds
— —, of oxygen
— —, of protoxide of nitrogen
— —, phosphorus (474)
— —, tar
— —, iodine
— —, sulphur
— —, sulphurous acid
— —, turpentine
— —, resins of all kinds
— —, narcotic
— —, sedative (503—508)
Inspirations, forced
Iodine
Iodides in general
Iodide of iron
Ipecacuanha
Ivy, ground
Juniper berries
Jalap
Juice of herbs
Kermes, mineral
Koumiss. See Milk
Laughter
Linseed
Lollium, or darnel
Lemon juice
Lactucarium
Lettuce
Lobsters
Lichen islandicus (Iceland moss)
Lichen pulmonarius (lung wort)
Lichen pixidatus
Lead
Leeks
Liquorice
Madder root
Milk, woman's
—, asses'
—, goats'
—, cows'
—, mares' fermented (koumiss)
Manganese
Manna
Mezereon
Mercurials, generally
Marrow, buffalo
Moxas
Myrrh
Marshy climates
Nightshade
Nitrate of silver
— — of potash
Narcotics in general
Oatmeal
Oils in general
Oil, olive
—, fish

Oil, cod-liver
—, skate
—, shark
—, essential, of different kinds
Orris root
Onions
Opium
Opiates of all kinds
Oxide of manganese
Oxygen
Oxymel (honey and vinegar)
— of squills
Oysters
Pine buds
— sap
Pomegranate
Parsley
Phellandrium
Phosphate of lime
Plantain
Polygonum hydropiper
— aviculare
Powder, Dover's
—, James's
Potash
Purgatives in general
—, saline
Phosphorus (474)
—, inhalations (474)
Pigeons' eyes
Quassia officinalis
— simaruba
Riding
Rotatory movement, so as to produce
  sickness
Resins in general
Revulsives of all kinds
Rhum
Roses
Serpentaria, or snake-root
Sundew
Sea-sickness
Sponge, burnt
Smoking
Snails in general
— fed upon sugar and flour
Soup, pork
—, turtle
Strawberries
Seeds, mucilaginous, of all kinds
Soda
Sulphur
Spermaceti
Sedatives in general
Setons
Saffron
Sago
Salivation, mercurial
Sarsaparilla
Sassafrass
Scammony
Salt
Senna
Sap of pine tree
Soot
Syrup, iodo-tannic
— of poppies
Stramonium
Styptics in general
Sudorifics in general
Sulphate of copper
— — iron
— — magnesia
— — potash
— — soda
— — zinc
Sulphide of antimony
— — calcium
— — potassium
Salt meats
Steam
Temperature, high
—, low
—, moderate
—, cold
—, over-heated rooms
Tobacco
Tannin
Taraxacum
Turpentine
Tin
Trigonella fœnum
Tar
Theriaca
Tonics of every kind
Toxicodendron, or poison-oak
Turbith, mineral
Uric acid
Urate of ammonia
Uva ursi
Vipers' flesh
— broth
Vapours. See Inhalations
Vinegar
Vomiting
Voyages, sea
Water, cold
—, Buxton
—, Bristol
—, Seltzer
—, Ems
—, sea
—, Spa
—, Bussang
—, Barège
—, Cauterets

Water, Harrogate
—, sulphurous
—, mineral of all kinds, used internally, each the best
Whey
Wines of every kind
Whiskey
Willow bark
Zinc

APPENDIX III.

REPORTS OF CASES IN THE THIRD STAGE BY DR. CHURCHILL.

515. The following *twenty-four cases in the third stage successfully treated by me with the hypophosphites* were originally published in the 'Medical Circular' for 1862. At the time they appeared they were received with the same incredulity and neglect as all my other statements concerning the hypophosphites. It is now an established fact that consumption in the third stage may be cured by my specific remedy; but owing to the grossly empirical manner in which it is too frequently applied, this result is obtained much less frequently than it might be. Since 1862, when I published the following reports, I have obtained a similar curative result in *several hundred cases* in the third stage, many of which were, or have been, for years in the enjoyment of sound health. Until my leaving Paris in 1870, I was in the habit of showing members of the medical profession who wished to see the effects of my treatment at my dispensary, No. 8, Rue Larrey, from six to a dozen patients who showed all the appearances of sound health, with the physical signs of a pulmonary excavation.

It would be easy to add, both from my private practice and the patients of my dispensary, No. 8, Rue Larrey, Paris, treated from 1858 to 1870, any number of cases of the same kind, but for several years I have *ceased* registering cases treated by the hypophosphites, and have only noted special points which I wished to investigate, such as complications, etc. When once the specific remedy of a disease and the conditions of its successful application are known, case-taking is of little or no use (151, 228—230), because the result can almost always be foretold with certainty. No one now takes note of cases of vaccination or of intermittent fever, and the same conduct will soon be followed with regard to consumption. Some future day the following reports will, however, have an historical interest as recording the first clinical proofs of the specific action of the hypophosphites.

The cases in the 'Medical Circular' were preceded by a few remarks which are reproduced because they are still applicable to a certain extent at the present day. The secondary remedies, however, used in some of these cases to combat accidental inflammation or other intercurrent complications would be now altogether superseded by the much more efficacious, because specific (441, 442, 506, 507), action of the inhalants. The remarks in the 'Medical Circular' were as follows:—

515 A. 'The objection usually made to reports of cases of recovery from consumption, in the first or second stage, is that there was, or at least that there may have been, an error of diagnosis. But this cannot apply to cases in the stage of excavation, because not only are the physical signs more strongly marked, and more pathognomonic, but also because, in case of recovery, they remain nearly permanent for a considerable lapse of time, even after all, or nearly all, the other symptoms have entirely disappeared. For these reasons I shall confine the following reports to cases in the stage of excavation. The instances of recovery from phthisis in this stage, placed upon record in the annals of medicine are so few, that the whole number hitherto published may almost be counted up on one's fingers.'

'Of the following twenty-four cases, four are from my first year's dispensary patients, and the remaining twenty from my private practice. I might easily (in 1862) have increased this latter number, but have not done so, because some of the cases are still too recent to justify me in regarding the result as quite permanent, and also because I think that twenty-four cases are a sufficient number to fix the opinion of all who are really open to conviction. Among the patients who are the objects of the following reports, all those residing in Paris or the French provinces might, if necessary, be brought forward, and in most instances it would be easy still to ascertain—first, the existence of the physical signs of pulmonary excavation; secondly, perfect health in every respect, except, at times, certain slight functional derangements (such as a little cough or dyspnœa), inseparable from the organic lesion. I have several times had the opportunity of presenting to members of the profession, who were desirous of ascertaining the effects of *my own* employment of the hypophosphites, a group of five or six patients offering at once the two conditions of *sound health and the physical signs of pulmonary excavation*.'

'In May and June, 1859, I offered to show the committee appointed by the Academy of Sciences to examine the "Memoir" which I had read in the previous year ("Mémoire sur le Traitement de la Phthisie pulmonaire et sur l'Action physiologique et Thérapeutique des Hypophosphites," lu à la Séance de l'Académie des Sciences le 31 Mars, 1858; "Comptes Rendus," tome xlvi. p. 1044), eight patients uniting the two conditions above-mentioned. I had not the good fortune to obtain any *official* cognizance of this proposal, which I am now ready to extend further still, by offering to produce *any number of such cases*, provided a time be allowed me proportionate to the number required.'

'In a pamphlet "On the Prevention of Consumption by the Hypophosphites," published in 1859, I stated (p. 11) that I then had fourteen such cases. Since that time the total number observed, and which I have now (in 1862) upon record (including those about to be reported), is *thirty-six*, independently of several of which notes were not taken. I also, either directly or indirectly, know positively of at least ten practitioners who have each cured one or two cases in the third stage by the use of the hypophosphites. No results such as these have ever been obtained by, or even claimed for, any other mode of treatment whatever.'

Case I.

Previous duration.—Three years and a half.

Symptoms.—Weakness; emaciation; cough; expectoration; thoracic pains; vomiting; sleeplessness; loss of appetite; dyspnœa; dysmenorrhœa.

Lesion.—Excavation at apex of left lung.

Result of Treatment.—Complete disappearance of general symptoms; persistence of physical signs.

Duration of Treatment.—Fourteen months.

M., aged thirty-five. Had been in a delicate state from 1848 to 1855. In January, 1855, she took cold; was ill for two months afterwards, and has been troubled with cough ever since. In April, 1856, became much worse, and then her physician recommended her to wear flannel, and prescribed cod-liver oil, bark, steel, &c. Under this treatment her health improved, and in 1857 she was able to take the management of a shop, where she slept on the ground-floor. In December, 1857, got much worse, the cough became violent, and her strength decreased daily. After again trying cod-liver oil, without relief, recourse was had to anodyne potions, syrups, and leeches to the epigastrium. Finding no relief from these, the patient came to consult me, when I found her in the following state:—

May 31, 1858.—Countenance pale; flesh soft and discoloured. Is so weak that she can scarcely walk at all, especially up-stairs. Considerable emaciation; cough almost continuous, coming on in violent fits, accompanied by acute pain in the chest and back, and often with vomiting; abundant muco-purulent expectoration; gets but little sleep, and cannot lie on the right side; has very little appetite; feels considerable dyspnœa; the catamenia occur as usual, but are very pale and scanty; pulse, 120.

Local signs.—In front, on percussion, well-marked dulness below the left clavicle, for about two fingers' breadth. On auscultation, gurgling in the left supra- and infra-clavicular regions. At the first point well-marked, and at the second imperfect pectoriloquy. On the right, exaggerated respiration, without râle or crepitus. Back on the left side, in the supra-spinous fossa, the same signs as in front; in the infra-spinous fossa, dry râles and increased vocal resonance. On the right, nothing abnormal except a few dry cracklings at the top.

Treatment.—Hypophosphite of soda, four grains daily.

June 15.—Cough nearly the same in the daytime, but much less troublesome at night; slept well last night, without being awakened as usual by fits of coughing; expectoration less abundant, and has become very nearly transparent; strength increased, so that she can now ascend several flights of stairs without fatigue; has no chest pains; appetite improved; still considerable shortness of breath; catamenia still very pale, but rather more abundant. Same treatment.

June 19.—Has taken cold, cough increased, and expectoration thicker, and says it has a disagreeable taste. Complains of a pricking sensation in the throat; appetite good; sleeps well; neither fever nor pains, and says she is getting stout.

Treatment.—A potion with oxysulphuret of antimony.

June 22.—Cough rather less troublesome; expectoration thicker and yellow; has bled at the nose twice, and suffered from somnolence and headache; appetite still good; neither fever nor pains.

Treatment.—As before: hypophosphite of soda, four grains every two days.

July 2.—Last catamenial discharge of higher colour, and more abundant; was attended with pains in the back and below the left breast, which still continue; cough still frequent; her strength increases, and she can attend to her business; sleeps well; has a good appetite; complains of palpitation of the heart.

Treatment.—Hypophosphite of soda, four grains daily.

July 16.—Looks much improved; the pains have nearly ceased; strength considerably increased; cough less frequent, and less fatiguing; expectoration has diminished; has a good appetite, and sleeps well; slight epistaxis once; digestion rather laborious; pulse, 100.

Treatment.—Hypophosphite of soda, four grains daily, after an interval of four days.

August 4.—On the 18th ult. patient felt extremely fatigued, with pains in the back and legs, headache, loss of appetite, and slight increase of cough. On the next day the menstrual discharge came on; it lasted a shorter time, but was more abundant, and of a rather higher colour, about the same as before the last aggravation of her complaint (in 1855). The cough and expectoration have diminished, but since yesterday the cough has slightly increased; did not sleep so well last night; slight epistaxis yesterday; appetite good; strength improving; dyspnœa much relieved, so that she has been able to dance twice without suffering from loss of breath.

Treatment suspended for a fortnight.

August 18.—Has been very well; goes into the country occasionally, and is able to take long walks; catamenia regular and natural. For the last three days the weather has been close and stormy; her sleep has been troubled; and she has felt some return of the pains in the chest. Cough slightly increased; appetite and strength rather less than usual.

Treatment.—Hypophosphite of soda, gr. ijss., at first daily, then every other day.

August 30.—Weather rainy for some days past; cough increased, especially at night; expectoration has again assumed a disagreeable taste; complains of sore throat, slight dyspnœa, a little headache, and epistaxis; has several times had violent palpitation of the heart.

Treatment.—An emetic.

September 6.—The emetic has acted, but has given little relief; cough not diminished; complains of pain in the right side; perspires frequently at night; dyspnœa increased; appetite and sleep continue good; the catamenia have appeared and continue to-day.

Treatment.—1. ℞ Sodæ hypos., gr. viij., daily.
2. ℞ Syrup. ipecac., ℥j.
By tea-spoonfuls occasionally.

October 4.—Much improved; has coughed very little; menses regular, but complains of a sharp pain below the right shoulder.

Treatment.—A blister to the seat of pain.

October 8.—The pain ceased of itself before applying the blister; complains of throat feeling very sore to-day; voice husky; pretty well in other respects. Sodæ hypophos. gr. x. daily.

October 18.—Laryngitis has disappeared; coughs but three or four times a day; expectoration more consistent; appetite good, and sleep sound.

Treatment.—Sodæ hypophos, gr. x., every other day.

November 5.—The discharge at the last menstrual period was abundant and high-coloured; cough and expectoration, which had almost ceased, have slightly increased with the fall in the temperature; appetite more capricious; sleep more disturbed; strength continues good; no dyspnœa.

November 9.—Coughs less; appetite has returned; sleep sound.

Treatment.—Sodæ hypophos., gr. x., daily.

November 28.—Catamenia very abundant, and very high-coloured; was very well until she had a fall, which shook her very much; since then cough has increased; appetite and sleep not quite so good.

December 13.—Slight change for the worse during the last few days; cough has again increased; expectorates a good deal. Menses have been less abundant. To-day complains of a violent pain between the shoulders. On auscultation, a few dry sibilant râles throughout both lungs, and chiefly the left. Cavernous breathing and a few gurglings during cough at apex. Sodæ hypophos., gr. v., daily.

December 20.—Pain has disappeared; feels much better since she has resumed taking the hypophosphite; is stronger, and coughs less; sleep sound; appetite good. Sodæ hypophos., gr. viij., daily.

January 11, 1859.—Cough diminished; appetite and sleep good; general state satisfactory; catamenia regular and natural. Sodæ hypophos., gr. viij., daily, after suspension for four days.

February 4.—Same state; is gaining flesh. Sodæ hypophos., gr. viij., every other day.

March 7.—General state about the same; cough trifling; sleep, appetite, and strength, all very good; catamenia regular. Sodæ hypophos., gr. viij., daily.

March 18.—Patient going on well; looks in complete health; appetite and sleep good; can take long walks without fatigue. Sodæ hypophos., gr. viij., every other day, after suspension for five days.

April 27.—Catamenia quite natural; has gone to another house, and cough has become rather worse since; has had attacks of giddiness and neuralgia daily for the last week or longer, which continue five or six hours, and prevent her from attending to anything whatever. 1. ℞ Quinæ hypophos., gr. iij., daily. 2. ℞ Tinct. aconit., gutt. x., daily.

May 6.—The neuralgia has almost disappeared; cough slightly increased.

Treatment suspended for ten days.

May 18.—Catamenia have been tolerably abundant, but rather pale; coughs a little in the morning, but scarcely at all during the day; in other respects, going on well. Sodæ hypophos., gr. viij., daily.

June 14.—Catamenia more abundant, and higher coloured than last time. ℞ Sodæ hypophos., gr. vj. Calc. hypophos., gr. iv., every three days.

July 8.—Cough rather increased; occasional thoracic pains, and a little headache. In other respects, very well. Getting stout. An emetic.

July 31.—Cough almost ceased; patient looks remarkably well; has quite recovered, and can attend to business as well as ever; feels quite well.

January, 1860.—This patient continues to take the hypophosphites occasionally in prophylactic doses. Is now in perfect health; has grown quite stout, and is as strong as ever she was. Neither cough nor expectoration; appetite, digestion, and menstruation, all perfectly natural.

On percussion anteriorly, slight decrease of resonance on the left side, above and below the clavicle. On auscultation at the same point, well-marked cavernous blowing, without râles or gurglings. After coughing, a little dry crepitus during inspiration. On the right, respiration normal.

I had an opportunity of seeing this patient in the summer of 1860. Her general health was then perfect. She was able, without the least ill-result, to endure great fatigue in the management of her business. She could walk several leagues without weariness or dyspnœa. The stethoscopic signs were the same as at the last examination, except that the crepitus then noticed had entirely disappeared.

June 1861.—The patient continues in the enjoyment of excellent health.

January, 1862.—Still continues as in June last.

CASE II.

Previous duration.—Twelve months.

Symptoms.—Emaciation; debility; fever and rigors; night sweats; sleeplessness; difficulty in lying down; thoracic pains; dyspnœa; cough; expectoration; hæmoptysis; anorexia; vomiting.

Lesion.—Softened tubercles occupying the upper part of right lung, and especially numerous at the apex; tubercles at the apex of the left. Subsequent formation of an excavation in the right lung.

Result of Treatment.—Disappearance of general symptoms and of stethosopic signs on left side; persistence of signs of cavity.

L., aged thirty-two, married.

October, 1857.—Disease began a year ago; since then has lost flesh considerably; loss of strength so great that he is now quite unable to attend to his business; fever, with rigors in the evening; night sweats; cannot sleep; unable to lie on the right side; complains of acute pain in that region, with a feeling of intense heat in the whole upper part of the chest, but more especially at the back, just below the shoulder-blade; great want of breath; cough frequent, short, hacking, and very troublesome; expectoration of about half a tumblerful of purulent matter daily; has spit blood several times; no appetite; frequent vomiting in the morning; no diarrhœa.

Local signs.—Chest expands less on the right side than on the left. On percussion, dulness over the whole extent of right side, in front. On auscultation, abundant moist crepitus above, and for about three fingers' breadth below the clavicle; coarse respiration in the rest of the lung. On the left, above the clavicle, weak respiration, with dry cracklings; normal vesicular expansion in the rest of the lung. Behind, during inspiration, the right shoulder rises less than the left. On percussion, decrease of resonance over the whole of right side. On auscultation, in the right supra-spinous fossa, moist crepitus of larger size than in the front; similar crepitus in the infra-spinous fossa on same side, especially in the intra-scapular region, where there is also considerable vocal resonance; lower down, respiration feeble to base. On the left, respiration nearly normal, but rather exaggerated in the whole upper part.

Diagnosis.—Softening tubercles occupying all the upper part of right lung, but most numerous at the apex; a few tubercles at the top of the left lung.

The patient being unable to remain any length of time in

Paris, I prescribed fifteen grains (196) of hypophosphite of soda daily. A month afterwards he wrote stating that all the general symptoms (debility, fever, night sweats, sleeplessness, chest pains, anorexia, vomiting) had disappeared, with the exception of a little cough and expectoration in the morning, and slight shortness of breath. This satisfactory state continued six weeks longer, when he informed me that the thoracic pains were more acute than before, that the dyspnœa was much worse, that his cough had become much more frequent, and the night sweats had reappeared occasionally. In answer to my questions, he said that he had taken the hypophosphite in doses of twenty to thirty grains daily. I advised him to come up to Paris that I might ascertain his real condition. On his doing so, I found that he presented a state of well-marked plethora (226). His pulse was 110, and the other general symptoms as just stated.

On examining the chest I noted the following: In front, on percussion, diminution of resonance on the right side. On auscultation, under the right clavicle, the moist crepitus was replaced by dry rhonchus, with increased vocal resonance. Lower down, and as far as the base, respiration very coarse and dry. On the left, normal but rough respiration. Behind, on percussion, dulness in the right infra- and supra-spinous fossæ. On auscultation, in the right supra-spinous fossa, abundant dry and sonorous crepitus, with considerable resonance of the voice. In the infra-spinous fossa equally abundant moist crepitus. In the intra-scapular region, cavernous respiration; pectoriloquy, with small gurglings, especially during cough. At the base, sibilant râles, mingled, on coughing, with abundant dry crepitus. On the left side, coarse respiration.

It was evident that a breaking down of tubercular matter had taken place, and that an excavation had formed; but that there was also considerable congestion of the pulmonary tissues, chiefly caused by over-doses of the hypophosphite. I prescribed cupping on his return home, and suspension of the hypophosphites for a whole month. I also ordered an appropriate antiphlogistic treatment, which soon removed all the symptoms complained of.

Saw the patient again in 1858, and again ascertained the existence of the following marked signs of excavation on the right side : In front, dulness on percussion. On auscultation, coarse respiration and considerable resonance of voice. Behind, dulness in the supra- and infra-spinous fossæ. On auscultation, in the supra-spinous fossa, respiration coarse, as in front, with imperfect pectoriloquy, and very great resonance of the cough. In the upper portion of the intra-scapular region, cavernous blowing, perfect pectoriloquy without either râle or crepitation, but with a distant clicking during cough. On the left side, respiration perfectly natural.

I have not since seen this patient, but he has written to me several times to say that he thought himself quite cured, had completely recovered his strength, could take any amount of exercise in all weathers without want of breath or fatigue, had grown quite stout, had no night-sweats, and slept well; that his thoracic pains had ceased; that he had a little cough, and no expectoration; no fever; good appetite; no vomiting; in short, that he was in perfect health.

1862, *February.*—At the present moment, more than four years after commencing his treatment, this patient still continues in the enjoyment of complete health.

March.—Have had an opportunity of examining this patient. Health perfect: goes out shooting. No sign or symptom remaining but bronchophony above and below right clavicle.

CASE III.

Previous duration.—Eighteen months.

Symptoms.—Weakness; loss of flesh; fever; rigors; night sweats; difficulty in lying down; want of breath; cough; expectoration; loss of appetite; dyspepsia; vomiting; amenorrhœa.

Lesion.—Excavation occupying the upper part, softened tubercles scattered over the anterior portion of left lung.

Result of Treatment.—Disappearance of general symptoms; persistence of signs of excavation.

Duration of Treatment.—Eighteen months.

Mme. R., aged thirty-six, March, 1858. Disease not hereditary; began about eighteen months ago, after taking cold. Since then, patient's strength has gradually fallen away, and she is now so weak that her husband had to carry her upstairs to my study. Considerable loss of flesh; fever almost continuous, with frequent rigors; profuse night sweats, so as to be obliged to change her linen three or four times every night; complains much of want of sleep. Utterly unable to lie on left side, but does not feel any thoracic pains; dyspnœa very distressing, especially when attempting to walk up-stairs. Cough frequent, with moderate muco-purulent expectoration. Has never had either hæmoptysis or epistaxis. No appetite; digestion painful; vomiting nearly every morning. Two months since, suffered from diarrhœa (five or six motions daily). Catamenia suppressed for three months past; no leucorrhœa. Unable to attend to anything, even to household affairs. Has already consulted several physicians, who have prescribed various modes of treatment, such as blisters, issues, narcotics, &c.

Local Signs.—In front, imperfect expansion on left side of chest. On percussion, dulness above left clavicle, as also below for three fingers' breadth; lower down, diminished resonance; on the right side, normal resonance. On the left side, above the clavicle, cavernous respiration, with numerous gurglings, increasing during cough; well-marked pectoriloquy. The same below the clavicle in the space corresponding to the dulness. Below, and quite to the base of lung, abundant moist crepitus intermixed with râles of a dryer character. On the right side, respiration normal. Behind, imperfect rising of the left shoulder during inspiration. On percussion, diminished resonance over the whole of left side. On auscultation, in the left supraspinous fossa, gurgling with cavernous respiration and pectoriloquy. Very weak respiration in the rest of the lung. Right side, normal.

Diagnosis.—Cavity occupying the upper part of left lung; softened tubercles scattered over the rest of that organ in front. This patient has presented the only instance of the kind which I have yet met with: for the first six weeks, though the dose of hypophosphite was increased to gr. xv. daily, I could not perceive any improvement, except, perhaps, a slight increase of strength (204). After that time, a change for the better took place, and soon became very apparent. In three months from the commencement of the treatment, the catamenia reappeared.

July, 1859.—Condition of patient now as follows:—Has quite recovered her strength, and has grown stout. Has neither fever nor rigors, nor night sweats. Sleeps well; still finds some difficulty in lying on her left side; no thoracic pains; very slight dyspnœa; coughs a little in the morning at times; no expectoration. Appetite very good; digestion easy, and no vomiting. Catamenia regular.

On examination, I noted the following:—In front, incomplete expansion of the upper ribs on the left side. On percussion, dulness above the left clavicle: underneath the resonance is good, and very nearly the same as on the other side. On the left, over the clavicle, blowing respiration, with well-marked pectoriloquy, but no râle or crepitus, a few dry clicks during cough. Below the clavicle, weak respiration for about two fingers' breadth; slight vocal resonance. Still lower, respiration normal. On the right, respiration natural; slight dulness on percussion. In the left supra-spinous fossa, increased vocal resonance; no other abnormal sign in the rest of the lung. On the right, respiration natural.

December, 1860.—Since last entry made, the patient has continued to enjoy excellent health. She has become pregnant, and gave birth to a son about the end of July last. Everything took place naturally, and she was able to leave her bed on the ninth day. Says that she felt much less weakened than during her previous confinements. Pectoriloquy and blowing respiration above the left clavicle.

May, 1861.—I have again seen this patient; she continues in excellent health. The stethoscopic phenomena remain nearly the same as in December last.

She was seen again *seven* years later and continued in perfect health.

Case IV.

Previous duration.—Two years and a half.

Symptoms.—Weakness; emaciation; fever; night sweats; sleeplessness; dyspnœa; cough; expectoration; hæmoptysis; dyspepsia; vomiting; inability to work.

Lesion.—Excavation at the apex of right lung.

Result of Treatment.—Complete disappearance of the general symptoms; persistence of the physical signs.

Duration of Treatment.—A year and a half.

F.C., aged thirty, married.

May, 1858.—Experienced first symptoms of disease two years and a half ago. Disease not hereditary. Complete loss of strength, with considerable emaciation; fever every day, but no rigors; night sweats so profuse as to wet four shirts; cannot sleep; dyspnœa so distressing that he can scarcely walk at all. Cough frequent; abundant muco-purulent expectoration. When first attacked, suffered from hæmoptysis for ten days. No epistaxis; no appetite; and frequent vomiting in the morning.

Had diarrhœa for a month at the beginning of his illness; has been obliged altogether to cease attending to business; has already tried different modes of treatment, such as camphor, blisters, cod-liver oil, tonics, &c.

Local signs.—Well-marked depression below the right clavicle; at the same point dulness on percussion. Large gurgling and perfect pectoriloquy, extending half-way to the nipple. On left side, coarse respiration without any other abnormal sign. Behind, on the right side, in the supra-spinous fossa, the same signs as in front. Respiration more feeble in the rest of the lung than in the left.

The patient followed the hypophosphite treatment, and experienced a gradual and continuous improvement, the particulars of which I need not give.

October, 1859.—The following was the state of the patient on the 14th:—Strength not completely recovered, but he is able to attend to his business, and to walk nearly the whole day without fatigue. Is gaining flesh, and is already ten pounds heavier. Neither night sweats nor fever for several months past; sleeps well. Very little, if any, want of breath, and seldom coughs or expectorates. No hæmoptysis; appetite good; never vomits, and digests well. No diarrhœa or colic; bowels regular. Below the clavicle, blowing respiration, perfect pectoriloquy, and slight gurgling during cough.

1860.—Have again seen this patient during the present year. His health continues good, notwithstanding close application to business, and several long journeys. The local signs remain the same, except that the gurgling last noted has been replaced by dry crepitus, which, however, is only heard during cough.

May, 1861.—The patient continues in the enjoyment of excellent health.

Case V.

Previous duration.—Twelve years.

Symptoms.—Weakness; emaciation; fever; night sweats; sleeplessness; thoracic pains; dyspnœa; cough; expectoration; hæmoptysis; want of appetite; dyspepsia; inability to attend to business.

Result of Treatment.—Disappearance of symptoms; persistence of physical signs.

Duration of Treatment.—Seven months.

B., aged fifty-one.

June, 1858.—Disease commenced twelve or fourteen years ago; is not hereditary. Patient says it began with bronchitis

In 1856 all the symptoms became so much worse that he was given up by several physicians who attended him. One of them thought he would not live more than a month. He says that, then, after a course of treatment, consisting in the application of numerous issues, he went to Switzerland, and found some relief to the debility, want of appetite, dyspepsia, and night sweats. But the improvement was only temporary, and had quite disappeared when he came to consult me. At present he complains that he has completely lost his strength, and is losing flesh daily. Has fever and rigors every day; profuse night sweats; cannot sleep; complains of intense pain in the left side, and of urgent dyspnœa; coughs much, with abundant muco-purulent expectoration; slight hæmoptysis on several occasions; appetite variable; digestion bad, with frequent vomiting; neither diarrhœa nor colic. Has been obliged to leave off business altogether.

The following was noted: Inspiratory expansion of the left side of chest very incomplete. Dulness on percussion above the left clavicle, as well as underneath for about four fingers' breadth. Over the whole extent of dulness, cavernous respiration, with abundant and loud gurgling; perfect pectoriloquy. Below, respiration very coarse down to base. On the right, nothing remarkable. Behind, on the left, diminished resonance over the whole lung. On auscultation, in the left supra-spinous fossa, coarse respiration, with bronchophony, but no crepitus. On the right side, respiration normal.

Diagnosis.—Excavation at the apex of the left lung.

The patient followed the specific treatment, with suspensions at proper intervals, till December 29, 1858. At that date there was scarcely any cough, and the expectoration was reduced to three or four sputa on getting up. He has grown perceptibly stouter, and recovered his strength, so that he can take long walks, and attend to business. Has neither fever, rigors, nor night sweats; appetite good; digestion easy; no vomiting; the thoracic pains have nearly disappeared; no dyspnœa; sleeps well; no hæmoptysis.

Local signs.—The expansion of left side of thorax still incomplete. In front, on percussion, dulness still present above, and for about four fingers' breadth below left clavicle. On auscultation, blowing respiration corresponding with the dulness; slight gurgling during forced inspiration; perfect pectoriloquy.

On the right respiration normal. Behind, the left side expands less, during inspiration, than the right. Resonance still diminished over the left side; respiration normal, but rather coarse. Right side natural.

October 14, 1859.—No general symptoms; continues to attend to business all day. Has not gained much flesh since December 29 last, but says that he has always been of a spare habit; neither fever, rigors, nor night sweats; appetite good; no dyspepsia nor vomiting. The only morbid phenomena of which any trace remains are the cough and expectoration, both, however, nearly insignificant.

The local signs are nearly the same as on the last examination: there is still dulness at the apex of the left lung, with blowing respiration and pectoriloquy. Over the rest of the left lung, as well as on the opposite side, the respiration is normal.

March, 1861.—The patient continues in the enjoyment of excellent health.

CASE VI.

Previous duration.—Six years.

Symptoms.—Blood-spitting; loss of flesh; weakness; cough; expectoration; dyspnœa; fever; loss of appetite; vomiting.

Lesion.—Excavation at the apex, and softening tubercles at the base of right lung, as well as disseminated over its posterior aspect.

Result of Treatment.—Disappearance of general symptoms and of signs of softening; persistence of signs of excavation.

Duration of Treatment.—Eleven months.

Mr. T., a gentleman from the United States, aged fifty-one, consulted me in June, 1858.—Has been ailing for the last six years. Hæmoptysis frequent, and in considerable quantity; for the last year, nearly every week. Has lost flesh very much, and has gradually sunk into a state of extreme debility; cough very frequent and fatiguing; sputa muco-purulent, rather abundant; much dyspnœa; feverish towards evening; night sweats not profuse, but constant; no appetite; digestion tolerably good, but vomiting very frequent in the morning. Bowels natural.

Imperfect expansion of right side of chest. Dulness, on percussion, in the supra- and infra-clavicular region, and over nearly the whole of right side; resonance natural over the left. On right side, above the clavicle, cavernous respiration; abundant gurgling during the cough; perfect pectoriloquy. The same signs below the clavicle. Lower down, and almost to base of lung, gurgling with abundant large moist crepitus. On the left side, coarse respiration. Behind, during respiration, right shoulder rises less than left. On percussion, diminished resonance over the whole of right side. On auscultation, in the supra-spinous fossa, moist cracklings, which are also scattered over the whole extent of lung, and especially numerous at base. On the left, exaggerated respiration.

Diagnosis.—Excavation occupying nearly the whole height of the right lung in front; softening tubercles at base, as also disseminated over all the posterior part of the same lung.

April, 1859.—The specific treatment has been continued from the date of first examination, with such modifications or suspensions as the patient's state required. With the exception of a certain amount of shortness of breath when walking up an ascent, and at times a little cough and expectoration, the patient feels quite well. The hæmoptysis ceased after taking the medicine for a month. In the course of the summer, the spitting of blood recurred once or twice, but not to any extent, except on one occasion, when it was stopped by the application of leeches (75). His strength and appetite have both returned. No fever, night sweats, or vomiting.

The local symptoms are as follows:—Inspiratory expansion incomplete on right side. On percussion, dulness above the right clavicle and below it for three fingers' breadth. On auscultation, blowing respiration over same extent as dulness; perfect pectoriloquy. Below, the respiratory murmur is weaker than on the left side, and during cough there are a few fine distant clickings. Behind, normal resonance on percussion. On auscultation, on the right side, respiration coarser than on the opposite side, but no rhonchus.

At this date, the patient was summoned to the United States on business. Nothing occurred during the voyage, and he returned to Paris in June, but left for Germany soon afterwards. He passed the winter there, but having taken cold, was seized with pleurisy of the left lung. Under proper treatment he recovered, and returned to Paris in the following October. On examining his chest, I found blowing respiration and pectoriloquy on the right side, as before, and, in addition, a few gurglings during cough, and moist rhonchi at the base. On the left side, well-marked friction sound. The general health not quite so good; and although the patient has taken the hypophosphites during his absence, he says he has derived no benefit from them. I ordered them to be suspended for the present, but as he wanted to leave for Italy, I prescribed a proper course of treatment. On his return to Paris, in March, 1860, he said that he had coughed more during his absence, had also lost flesh, was weaker, and suffered more from dyspnœa than when he left. On auscultation, I found, as on the last examination, blowing respiration, with pectoriloquy on the right side, gurgling, and a few moist rhonchi extending down to the base. On the left, coarse respiration without any rubbing sound. Behind, at base, on the right side, a few dry rhonchi. The patient had derived no benefit from his sojourn in Italy; he had taken the hypophosphites too frequently, and in too large doses (199—203). After two months of proper antiphlogistic treatment, all the morbid symptoms had disappeared from the right side, with the exception of pectoriloquy and cavernous breathing. The cough, expectoration, and dyspnœa had all but ceased; the patient ate with good appetite; had grown stout; no fever. The hæmoptysis and vomiting had also disappeared.

In June, 1860, he left for the United States. Since then, in April, 1862, I have heard that his health continues quite good.

Case VII.

Previous duration.—Eighteen months.

Symptoms.—Debility; emaciation; fever; night sweats; difficulty in lying down; thoracic pains; dyspnœa; cough; expectoration; hæmoptysis; loss of appetite; incapacity for exertion of any kind.

Lesion. — Excavation occupying the upper part, softening tubercles scattered through the rest of right lung.

Result of Treatment.—Almost total disappearance of general symptoms; persistence of signs of excavation.

Duration of Treatment.—Six months.

Miss B., an English lady, aged thirty-seven.

October, 1858.—Disease not hereditary. Began eighteen months ago, by a succession of colds; complains of total loss of strength and great loss of flesh; continued fever, with occasional rigors; night sweats not very frequent; sleeps tolerably well; cannot lie on the right side, and feels pain in that region; distressing shortness of breath; coughs a great deal, with very abundant muco-purulent expectoration; hæmoptysis every two or three weeks, but not considerable; no epistaxis: no appetite; no vomitings; digestion good; occasional diarrhœa; menstruation regular; no leucorrhœa.

The patient has been obliged to cease all kinds of exercise, and is scarcely able even to write a few lines now and then. Under the advice of different physicians, she has already used various remedies, especially cod-liver oil, iodide of iron, residence in Italy, etc., but without any perceptible benefit.

In front, well marked sinking-in below the right clavicle; incomplete expansion of the ribs on that side. Percussion dulness over the whole of right side, most marked in the upper half. In the part corresponding with the dulness, cavernous respiration and perfect pectoriloquy. Lower down moist crepitus and increased vocal resonance. Left side natural. Posteriorly the right shoulder rises less during inspiration than the left. Diminution of percussion resonance over the whole of right side, most marked in the supra-spinous fossa. In the right supraspinous fossa, cavernous respiration, gurgling, and pectoriloquy. Lower down, respiration weaker than on the opposite side, with a dry scattered cracklings and bronchophony. On the left, coarse respiration.

Diagnosis.—Excavation in upper part of right lung; softening tubercles disseminated throughout the rest of the organ.

The hypophosphites were taken, with suspensions at proper intervals, until March, 1859. Patient had then recovered her strength, and grown perceptibly stouter. Thoracic pains and fever had disappeared; appetite and digestive functions good; cough and expectoration almost ceased; dyspnœa had so far diminished that she could walk a long distance without difficulty; menstruation regular. The physical signs were reduced to those caused by the excavation; there was still dulness on the right side, with blowing respiration and pectoriloquy. The gurgling replaced by a few moist rhonchi after coughing or prolonged inspiration. At this period, patient went to Switzerland, and soon after her arrival there was attacked with pleurisy in the left side. She recovered, however, and returned to Paris in the winter of 1859. I then examined her chest, and found the stethoscopic signs on the right side less favourable than when she left, though far from being so intense as before she began the use of the hypophosphites. The gurgling had re-appeared in the upper part of the right lung. Also at the base of the same side, both in front and behind, there were rhonchi of variable kinds and intensity. In front, on the left side, there was a fixed pain at one point. At this same spot, on auscultation, I found a well marked rubbing sound. There were also a few sibilant rhonchi over the whole of the left lung. The morbid signs of the left side were removed by proper treatment (chiefly counter-irritation), and in the beginning of 1860, the patient was sufficiently recovered to return home. Her state was then as follows :—

Not quite so strong as before her first attack of illness. No fever nor chills; sleeps well, no night sweats; still unable to lie on the right side, but feels no pain there; her breathing is much freer; cough still rather frequent, especially in the morning; expectoration small in quantity, and almost entirely of transparent mucus; no hæmoptysis for several months past; appetite good; neither dyspepsia nor vomiting; menstruation regular.

Local Signs.—In front, considerable depression under the clavicle; incomplete inspiratory expansion. On percussion, dullness over the whole of right side, more especially over the upper half. On auscultation, above the right clavicle, blowing respiration, with no crepitus, except a few dry rhonchi during forced inspiration or coughing; complete pectoriloquy; at the base, a few sibilant rhonchi intermixed with fine crepitus; breathing natural. On left side, behind, incomplete rising of the right scapula during inspiration. On percussion, diminution of resonance in the right supra-spinous fossa. On auscultation, in the right supra-spinous fossa, blowing respiration, with pectoriloquy. Over the rest of the lung, respiration nearly normal. Left side, normal.

CASE VIII.

Previous duration.—Two years.

Symptoms.—Debility; emaciation; night sweats; hæmoptysis; dyspnœa; cough; expectoration; difficulty in lying down; loss of appetite.

Lesion.—Excavation in the right lung, tubercles at apex of left.

Result of Treatment.—Disappearance of general symptoms, and of local signs on the left side; persistence of signs of cavity.

Duration of Treatment.—Twenty-one months, with intervals of suspension.

Mr. W., aged thirty-one, a native of the United States.

One of his sisters died of a galloping consumption, has a brother suffering from scrofula.

April, 1859.—Disease began in May, 1857, by cold after great fatigue and excessive application to business. The same year he made a voyage to Europe for the benefit of his health, and afterwards returned home. As he continued getting much worse, he determined to return to Europe, and place himself under my care. I noted the following: great weakness; has been several times compelled to leave off business; one of these interruptions lasted seven months; considerable emaciation; before his illness weighed 158 lbs., but now weighs only 120 lbs.; night sweats; abundant and frequent hæmoptysis; great dyspnœa; cough moderate; muco-purulent expectoration (about two table-spoonfuls in twenty-four hours); difficulty in lying down; no appetite; neither dyspepsia nor diarrhœa.

Local signs.—Imperfect expansion of right side of chest. On percussion, dulness over right clavicle, and below for three fingers' breadth. Lower still, diminished resonance as far as to base; on the left side, diminution of resonance below clavicle, over an extent of one finger's breadth. On the right side, above the clavicle, cavernous respiration; gurgling and pectoriloquy. Same signs beneath, over the same extent as dulness; large moist rhonchi down to base. On the left, a few dry cracklings, more numerous after coughing. Posteriorly, the right shoulder rises on inspiration less than the left. Percussion dulness in the right supra-spinous fossa; diminished resonance over the rest of this side. In the right supra-spinous fossa small gurglings during cough, with bronchophony. Normal respiration on the left side.

Diagnosis.—Excavation in the right lung; tubercles at the apex of the left.

Patient being obliged to return to the United States, after only two months treatment, I advised him to continue the use of the hypophosphites, but in smaller doses than when he was under my immediate care. By this means, all the general symptoms disappeared, except those depending on the local state—viz., cough, expectoration, and dyspnœa. The patient grew stout; attended to business as usual; and thought himself cured. But early in the spring of 1860, he began to complain of a feeling of tightness in the chest, and a pain in the right side; the cough became dryer and more frequent; the shortness of breathing increased; and these symptoms at last were followed by several attacks of hæmoptysis. Things continued in this state, with alternations of better and worse, until he decided on coming back to Europe, to consult me once more.

On his arrival (in September, 1860), I found him in the following condition: in front, on percussion, dulness above the right clavicle, and below it over a space of three fingers' breadth. Resonance somewhat diminished in the rest of the lung and summit of the left. On the right, cavernous respiration over the space corresponding to the dulness; a few small gurglings towards the middle of the lung. In the rest of the upper part, coarse respiration; and, on deep inspiration, a few dry rhonchi. Coarse respiration in left lung. Behind, on percussion, dulness in the right supra-spinous fossa, diminution of resonance over the rest of that side. On auscultation, in the right supra-spinous fossa, distant gurgling during cough; bronchophony. In the rest of the lung, harsh and coarse respiration without rhonchi. Respiration coarse in left lung. For some time past the cough has become much more frequent and more troublesome, and there has been considerable increase of the dyspnœa. Here was evidently a state of congestion, favoured, no doubt, by the injudicious continuation of the hypophosphites.

Under appropriate antiphlogistic treatment, these symptoms were removed, and now (in April, 1861) the patient is as well as he ever has been. His strength is all that could be desired. He passed last winter in Paris, and was able to go out in all weathers. He has grown stout, and now weighs 150 lbs.; no night sweats; no hæmoptysis; breathing easy, so that he can walk up to the fourth or fifth floor without difficulty; coughs in the morning only, and the expectoration is limited to five or six white and mucous sputa; good appetite; looks well. The physical signs of the excavation remain as before, except that the gurglings heard during cough are still less perceptible than in September. The coarseness of the respiratory murmur previously noticed has disapppeared.

CASE IX.

Previous duration.—Six months.

Symptoms.—Emaciation; debility; cough; expectoration; hæmoptysis; hoarseness; loss of appetite; dyspepsia; difficulty in lying down.

Lesion.—Cavity in the right lung; softening tubercles at summit of left lung in front; obstruction and insufficiency of aortic orifice.

Result of Treatment.—Disappearance of the general symptoms; persistence of signs of excavation.

Duration of Treatment.—A year.

Monsieur D., aged thirty-six.

July, 1859.—Patient's father died of chest complaint, complicated with disease of the heart. The patient fell ill about six months ago with a cough and wheezing in the throat. After taking a cough mixture for about six weeks these symptoms disappeared, but soon returned and were followed by hæmoptysis, to the extent of about two table-spoonfuls. Since this first attack of hæmoptysis he has had three others at different periods.

Present state as follows: Considerable emaciation; much debility; slight cough; expectoration of three or four sputa every morning; voice very weak, scarcely above a whisper; loss of appetite; indigestion; no vomiting; no fever or night sweats; inability to lie on right side; pulse 120, small and weak. On examining the throat, I found considerable elongation of the uvula, which was removed by excision, without, however, producing any improvement in the frequency or character of the cough.

Local signs.—Marked depression below both clavicles; imperfect expansion of both sides of chest, more particularly the right. Percussion dulness over whole of right side; diminution of resonance on the left above the clavicle, and below it for two fingers' breadth. On right side above the clavicle, large moist rhonchi, with exaggerated vocal resonance. Below, for three fingers' breadth, cavernous respiration; gurglings, imperfect pectoriloquy. Lower down, coarse respiration, with a few moist cracklings. On the left side, above the clavicle, numerous moist cracklings. Same signs below the clavicle. At the precordial region, systolic murmur at base prolonged towards the arch of the aorta, with slighter diastolic souffle. Behind, on percussion, decreased resonance over the whole of right side. On auscultation, diminution of respiratory murmur over the whole of right lung. On left side, respiration nearly normal.

Diagnosis.—Excavation in the right lung; softening tubercles at the front apex of the left. Insufficiency and obstruction of aortic orifice.

Under the influence of the specific treatment, the general signs successively disappeared; cough ceased altogether; expectoration was reduced to one or two sputa daily; the voice returned to its natural state. On auscultation, on the left, the respiratory sound was normal. On the right, the gurglings had diminished.

In April, 1860, the patient had an attack of influenza. His strength diminished; he complained of violent thoracic pains; of difficulty in lying down; fever and rigors towards evening, No night sweats, and voice continued good. On auscultation. left summit presented signs of congestion, exaggerated vocal resonance, and a few rhonchi. On the right, the gurglings became larger and more distinctly marked. Under the influence of appropriate treatment, these symptoms soon disappeared, but returned in the month of August, owing to the patient having taken cold. The cough and expectoration re-appeared ; dyspnœa considerably increased, and hæmoptysis followed. By the application of leeches to the arms, and other means, the patient was restored to his previous state of health, having been confined to the house only three or four days. Since then his health has been good. He says that he never was stouter than at present; he has recovered his strength, and goes out in all weathers. Scarcely any cough; expectoration in the morning only of about a tea-spoonful of transparent mucus; voice natural; appetite excellent; digestion perfect. The only symptom of which he complains is considerable dyspnœa, chiefly caused by the disease of the heart. Pulse 80. As to the local signs, I found cavernous respiration in the right side, without rhonchi, but a distinct clicking after cough. Pectoriloquy. On the left, nothing abnormal.

This patient is in a less satisfactory state than the others, though the general signs have almost completely disappeared, and the local signs have decidedly improved. The dyspnœa has, however, increased, notwithstanding the improvement in the condition of the lungs, owing to the heart disease: thus showing that the influence of the hypophosphites is the more strongly marked in proportion as the tubercular diathesis is free from complication.

CASE X.

Previous duration.—Several years.

Symptoms.—Debility; emaciation; fever; rigors; nocturnal perspiration; dyspnœa; loss of voice; cough; expectoration; hæmoptysis; thoracic pains; anorexia; dyspepsia; vomiting; inability to attend to business.

Lesion.—Excavation occupying upper third of left lung; softening tubercles extending to base of same organ in front.

Result of Treatment.—Disappearance of general symptoms; persistence of signs of excavation, and weakness of voice.

Duration of Treatment.—Fifteen months and a half.

Monsieur P., married, aged fifty-four.

August, 1859.—Has had a cough for some years past, but a month ago experienced such an aggravation of all the symptoms of his complaint, that he was obliged to relinquish his ordinary occupations. None of his relations have suffered from chest-disease. There is complete loss of strength and considerable emaciation; much fever and rigors at night; profuse perspiration; complains of great breathlessness on the least exertion; almost incessant cough; very abundant muco-purulent expectoration; has spit blood several times, and in considerable quantities; pain below the left shoulder blade; sleeps very well, and can lie in any position; no appetite, and digestion very laborious; nausea every morning, sometimes attended with vomiting; bowels regular; the voice is reduced to a mere whisper; windpipe painful on pressure; has already consulted several physicians, and followed different modes of treatment, of which he cannot give the particulars.

Local signs.—Anteriorly, expansion of the chest imperfect on left side. Dulness, on percussion, over the whole of that side. At the upper third of left lung cavernous blowing, with large and abundant gurgles during cough. Over the rest of this side, large mucous rhonchi. Vocal phenomena wanting, owing to loss of voice. On the right side breathing normal. Behind imperfect rising of left shoulder during inspiration. Decreased resonance, on percussion, over the whole of left side. In the left supra-spinous fossa, and in the middle part of the intra-scapula region, cavernous blowing with numerous gurgles, which increase during cough. No perceptible vocal phenomena. Right side, natural.

Diagnosis.—Excavation occupying upper third of left lung; softening tubercles extending to base of same organ in front. The patient was ordered to take the hypophosphites, and his state on December 12, 1860, was as follows: Feels perfectly well, except occasionally a slight tickling in the throat. His voice is natural in the morning, but becomes hoarse and husky at night; has also slight cough and expectoration; has quite recovered his strength, and can attend to business. Passed the summer in the country, and was able to take long walks without suffering from shortness of breath or fatigue; has gained flesh perceptibly, and was never, even before his illness, so stout as at present. For a long time past has had neither fever, rigors, nor night sweats. Sleeps well, and can lie in any position; appetite very good; digestion no longer painful; no nausea or vomiting in the morning; no hæmoptysis nor epistaxis; his whole appearance is that of perfect health. On examination, I note the following: in front, incomplete expansion of left side during inspiration. Dulness, on percussion, over the whole of the left side, more especially for three fingers' breadth below the clavicle. On the right, resonance normal. On auscultation of the left side, blowing respiration, especially in the part corresponding with the greatest dulness; considerable resonance of cough, which is accompanied by a few fine small gurglings, intermixed with some dry crepitus. Pectoriloquy imperfect, owing to weakness of voice. Lower down, a few sibilant rhonchi and dry cracklings perceptible, however, only during forced inspiration. On the right side, normal vesicular murmur. Posteriorly, the expansion of thorax during inspiration is diminished on the left side. Diminution of resonance over the whole of left side, particularly marked in the infra-spinous fossa. Exaggerated respiration throughout the whole of left lung, but without rhonchi of any kind. In the centre of the intra-scapula region, blowing expiration and bronchophony. On the right, respiration normal.

January, 1862.—The patient continues in the enjoyment of better health than he had ever known before. With the exception of a slight huskiness, he has completely recovered the use of his voice. At apex of left lung, anteriorly and posteriorly, blowing respiration and bronchophony; no other physical sign remaining; no cough or expectoration.

CASE XI.

Previous duration.—One year.

Symptoms.—Emaciation; debility; dyspnœa; night sweats; fever and rigors; insomnia; thoracic pains; difficulty in lying down; cough; expectoration; hæmoptysis; hoarseness; vomiting; loss of appetite; diarrhœa.

Lesion.—Excavation occupying the upper part of right lung; softening tubercles scattered over its anterior aspect, and at its posterior apex.

Result of Treatment.—Disappearance of general symptoms; persistence of signs of excavation.

Duration of Treatment.—Fifteen months.

Monsieur D., aged thirty-two.

August, 1859.—Has been ailing for more than a year; considerable loss of flesh; extreme debility; great want of breath;

abundant night sweats; fever and rigors in the evening; pulse 100; cannot sleep; complains of a very acute pain in right side of thorax, and cannot lie on that side; continual cough; muco-purulent, and nummular expectoration, about half a tumblerful daily; has had hæmopytsis several times; voice hoarse and weak; frequently vomits after fits of coughing; no appetite; digestion bad; occasional diarrhœa; very often obliged to refrain from attending to business.

Local signs.—In front, imperfect inspiratory expansion of both sides of thorax, particularly the right. Dulness, on percussion, above the right clavicle, and over the whole of that side; diminished resonance below the left clavicle. On auscultation, above the right clavicle, large moist râles and increased resonance of voice. Same signs below the clavicle, and in the upper two-thirds of the lung. Lower down, fine moist crepitus. On the left, very coarse respiration, with increased vocal resonance at the apex. Behind, incomplete rising of the right shoulder during inspiration. Dulness, on percussion, in the right supra-spinous fossa, diminished resonance in the infra-spinous fossa, of the same side. On the left side, normal resonance. On the right side, coarse respiration, with a few dry crepitus in the supra-spinous fossa. On the left, normal respiration.

Diagnosis.—Softening tubercles occupying the anterior aspect and posterior apex of the right lung; crude tubercles at the apex of left lung. After following the specific treatment, the greater part of the general symptoms disappeared, except slight dyspnœa; patient gained flesh, but slowly; the night-sweats also still occurred at irregular intervals; but the hæmoptysis ceased; the cough and expectoration disappeared; the strength returned; the fever ceased, as well as the rigors and thoracic pains; the patient slept well; appetite became good, and digestion easy; no vomiting or diarrhœa; voice nearly in its normal state. Nevertheless the stethoscopic signs continued to get worse, and in November the moist râles, first heard below the right clavicle, were replaced by a cavernous blowing and gurglings. On the left side, the respiration became softer, but without recovering its normal character. It was evident that a cavity had formed, and my first diagnosis now required to be replaced by the following:—Cavity occupying the upper part of right lung; softening tubercles scattered over the rest of that organ in front and on its posterior apex. In the course of the winter there was an aggravation of the cough and expectoration on three several occasions, and a momentary return of the general symptoms of fever, want of sleep and appetite, dyspepsia, and diarrhœa, which, however, yielded to appropriate antiphlogistic treatment. Once in the spring, there was a rather abundant hæmorrhage, after fatigue and cold during a journey. At the same time the gurglings became more marked on the right side, and the patient complained of a sharp pain on the left. On auscultation, I found at the apex of the left lung a few dry sibilant rhonchi, with increased resonance of voice. I had, therefore, cause to apprehend softening of the tubercular deposit which had been diagnosticated at the beginning of the treatment. These symptoms were removed by the exhibition of two emetics and local bloodletting.

In October, 1860, the state of the patient was as follows: he had got stout, felt no weakness, and could attend to business; still coughed a little in the morning, and raised about two teaspoonsful of frothy expectoration; the dyspnœa, night sweats, fever and rigors had quite disappeared; he slept well; no thoracic pains or difficulty in lying down; no return of hæmoptysis; had recovered his voice, and could talk for any length of time without inconvenience; appetite good; digestion excellent; neither vomiting nor diarrhœa; pulse 70.

Local signs.—In front, on the right side, imperfect inspiratory expansion. On percussion, diminution of resonance above and below the right clavicle. On auscultation above the right clavicle, and below for about two inches, blowing respiration without rhonchi; pectoriloquy; during cough, over the middle of the lung, fine distant gurglings. At the base, coarse respiration, with dry crepitus and a few sonorous rhonchi on forced inspiration. On the left side, normal vesicular expansion. Behind, on percussion, diminution of resonance in the right supra-spinous fossa; weakness of respiratory murmur; exaggerated vocal resonance. In the rest of the lung, normal respiration. On the left, normal vesicular expansion throughout.

In May, 1861, this patient continued to enjoy perfect health, after having passed through two winters.

CASE XII.

Previous duration.—Two years.

Symptoms.—Loss of flesh; weakness; dyspnœa; fever; loss of sleep; thoracic pains; recumbency difficult; night sweats; cough; expectoration; hæmoptysis; anorexia; vomiting; hoarseness; diarrhœa.

Lesion.—Cavity occupying upper third of right lung.

Result of Treatment.—Disappearance of general symptoms; persistence of signs of cavity.

Duration of Treatment.—Eight months.

Mr. S., aged twenty-nine, a native of the United States.

August, 1859.—Several of patient's relatives have died of consumption; has been ill for two years, during which has successively tried cod-liver oil, preparations of iron, the alcoholic treatment, and residence in warm climates. Notwithstanding these means, the disease has continued to progress. At present his emaciation is extreme, as also his weakness, so that he can hardly walk up to the second floor; great dyspnœa; fever at nightfall, but no rigors; pulse 120; sleeps badly, and complains of acute pains in the right side which prevent him altogether from lying on it; profuse night sweats, especially about the head and neck; incessant, dry and hacking cough. Expectoration of three-fourths of a tumblerful of muco-purulent sputa floating in an abundant salivary and frothy liquid; he has had several attacks of hæmoptysis; no appetite; vomiting nearly every day; his voice is hoarse, and he complains of a continual tickling in the throat. On examination, I find considerable elongation of uvula; has had diarrhœa occasionally.

Local signs.—In front, imperfect expansion of the right side of thorax. On percussion, dulness over the upper third of right lung. On right side, and over the space corresponding with the dulness, cavernous respiration; numerous gurglings; pectoriloquy; below, coarse respiration down to base. On the left, coarse respiration. Behind, on percussion, diminished resonance over right side. On auscultation on right side, in the fossæ supra et infra-spinatæ, very coarse respiration, with distant gurgling; imperfect pectoriloquy in the upper part of the intra-scapular region.

Diagnosis.—Cavity occupying the upper third of right lung. After taking the hypophosphites some time, there was improvement of the general symptoms, except the cough, which continued to occur in violent fits, and the tickling in the throat, which remained very troublesome. Gargles having been tried to no purpose, I excised the uvula, but without any perceptible improvement; the cough, which was always brought on by the patient's lying down, continued with the same violence. By sponging the larynx with a solution of iodine in glycerine, this was, however, gradually lessened, and the improvement of the general symptoms continued without interruption. The physical signs decreased in a similar ratio.

In March, 1860, I considered the cure permanent, and the patient left Paris, where he had stayed through the winter. He now coughed a little in the morning only, and the expectoration was very trifling. The dyspnœa had entirely disappeared, and he could run up stairs; he had recovered his voice, and grown both stout and strong; the fever and night sweats had ceased, as had also the thoracic pains; appetite good; neither vomiting nor diarrhœa.

Local signs.—Imperfect inspiratory expansion of right side of chest. In front, on percussion, dulness on right side. Blowing respiration, with pectoriloquy over the region of dulness, but no rhonchi or cracklings. On the left side, respiration normal. Behind, on percussion, resonance slightly diminished on the right. On auscultation, in the upper part of the intrascapula region, considerable resonance of voice, with a few rhonchi on forced inspirations. No gurglings nor cracklings.

The patient returned to Paris in the July following. His general health continued excellent. On auscultation, the same signs were found as before, with the exception of the rhonchi, which had disappeared. Shortly after, he again left Paris for the United States.

I have since learned, that his health has remained perfectly good.

CASE XIII.

Previous duration.—Three years.

Symptoms.—Hæmoptysis; debility; emaciation; thoracic pains; difficulty in lying down; fever; night sweats; dyspnœa; cough, expectoration; hoarseness; loss of appetite; dyspepsia; vomiting; diarrhœa; inability to attend to business.

Lesion.—Cavity in the left lung; softening tubercles occupying the whole of the front aspect of the same organ; tubercular deposit at the apex of the right lung.

Result of Treatment.—Disappearance of general symptoms, and of the local signs on the right side. Persistence of signs of excavation.

Duration of Treatment.—Nine months.

M. V., unmarried, aged twenty-seven.

September, 1859.—Weak constitution; lymphatico-sanguine temperament; thin face; waxy complexion; hippocratic fingers; has nearly always been ailing. His present complaint began three or four years ago with hæmoptysis. None of his family have been consumptive. Great debility and considerable emaciation; complains of flying thoracic pains; cannot lie on the left side; sleeps well; has fever at nightfall, with occasional chills; has night sweats, but not excessive; has had several slight attacks of hæmoptysis; great want of breath; coughs a good deal, with abundant muco-purulent expectoration; voice hoarse, and scarcely above a whisper; no appetite, digestion laborious, and vomiting frequent. Was troubled with diarrhœa all last winter. Has been obliged to desist, in a great measure, from his usual occupation as a teacher, and can scarcely give two hours' lessons a day. For some years past has been compelled to pass the winter in the South, being unable to endure the climate of Paris.

Local signs.—Unequal expansion of the two sides of the thorax, the left side scarcely rising at all during inspiration. In front, dulness on percussion over the whole of left side; diminished resonance on the right side, for about two fingers' breadth, below the clavicle. On auscultation, on the left above the clavicle, blowing respiration, with numerous gurglings, intermixed with moist crepitus; cavernous cough, and perfect pectoriloquy. The same signs below the clavicle; moist cracklings extending down to base. On the right, above the clavicle, jerking respiration, with a few cracklings increasing during cough; increased vocal resonance; exaggerated respiration in the rest of lungs. Behind, on percussion, dulness in the left supra-spinous fossa. On auscultation, on the left, some cracklings in the infra-spinous fossa, nothing abnormal on the right side.

Diagnosis.—Cavity at the apex of left lung; softening tubercles over the whole of its front aspect; a few tubercles beginning to soften at the front apex of right lung. He was ordered the hypophosphites, which were continued till May 26, 1860, when his state was noted as follows:—Much less weakness; no thoracic pains or difficulty in lying down; is gaining flesh, and sleeps well; no fever, rigors, nor night sweats; has had hæmoptysis but once only, and then very slight; cough has almost ceased, and expectoration much less abundant; the hoarseness has nearly disappeared; no vomiting or diarrhœa; appetite good.

The patient has resumed his professional duties, and gets through them with less fatigue, he says, than before his illness; has been able to pass the whole of last winter in Paris, and give his lessons.

Local signs.—The left side during inspiration almost motionless. In front, on percussion, dulness over the whole of left side; diminished resonance for about two fingers' breadth under right clavicle. On auscultation, on the left side, in the supra and sub-clavicular regions, cavernous respiration, but no gurglings, even on coughing; pectoriloquy; cavernous cough without cracklings or rhonchi, but followed immediately after by a few large moist cracklings. On the right, above the clavicle, jerking respiration, and slightly exaggerated vocal resonance; normal respiration in the rest of the lung. Behind, on percussion, dulness in the left supra-spinous fossa. On left side, in the fossa supra-spinata, weak respiration; normal respiration in the rest of the lung; nothing abnormal on the right.

At this time the patient left Paris, and I have not heard of him since.

CASE XIV.

Previous duration.—Five years.

Symptoms.—Weakness; emaciation; dyspnœa; cough; expectoration; fever; weakness; night sweats; thoracic pains; loss of appetite; difficulty in lying down; dyspepsia; vomiting; diarrhœa.

Lesion.—Cavity in the right lung; tubercles at front apex of left lung.

Result of Treatment.—Disappearance of general symptoms, and of the stethoscopic signs of the left side; persistence of the signs of cavity.

Duration of Treatment.—Seven months.

Mrs. H., an English lady, aged thirty, consulted me in October, 1859.—Disease not hereditary; came on about five years ago; patient now in a state of extreme debility; walks with the greatest difficulty, and is totally unable to go up even one pair of stairs. Considerable emaciation; distressing dyspnœa; cough very fatiguing and frequent; abundant muco-purulent expectoration (of about a pint daily). No hæmoptysis; fever at nightfall, shiverings; night sweats, especially about the head and neck; complains of a pain in right side of chest, and cannot lie either on that side or on her back; appetite completely lost;

digestion bad, and vomiting frequent; diarrhœa occasionally; menstruation continues regular; pulse 120. Patient has already followed a variety of treatments, and taken cod-liver oil for several years.

Local signs.—In front, marked depression below right clavicle; scarcely any inspiratory expansion on that side. On percussion, dulness over the whole of right side; diminished resonance below the left clavicle for about two fingers' breadth. On auscultation, on the right, cavernous respiration; well-marked pectoriloquy above the clavicle, as well as below, for three fingers' breadth; large and numerous gurglings throughout the whole of that extent. On the left, in the space corresponding with the dulness, numerous dry cracklings, much increased during cough. Behind, percussion dulness over the whole of right side; diminished respiratory murmur over the whole of right lung; increased vocal resonance in supra-spinous fossa. On the left, exaggerated respiration.

Diagnosis.—Cavity in the right lung; tubercles in front at the apex of left.

April, 1860.—Under the influence of the specific treatment all the general symptoms have undergone rapid improvement, and successively disappeared. Patient is now able to take long walks, and go up four pair of stairs without the least inconvenience. The cough has disappeared almost entirely, and expectoration is reduced to about a spoonful daily. The night sweats have ceased, as well as the fever and dyspnœa. The appetite is good; digests easily, and never vomits; menstruation regular; no diarrhœa; pulse 80. On percussion, the same dulness as formerly on right side. On auscultation of right lung, blowing respiration, pectoriloquy; gurgling during cough only. At the base, a few moist rhonchi. Behind, percussion and auscultation offer nothing abnormal.

The patient then left Paris for England, but returned the following October. She continued to enjoy good health. Notwithstanding the cold and inclement summer of 1860, she was able to take her usual walks, and could even run without difficulty. She had continued to gain flesh. On auscultation, the moist râles of the right side had disappeared, and in their place there was a little subcrepitant râle.

CASE XV.

Previous duration.—Seven years.
Symptoms.—Emaciation; debility; dyspnœa; cough; expectoration; loss of appetite; night sweats; thoracic pains; fever; leucorrhœa; hoarseness.
Lesion.—Cavity in left lung.
Result of Treatment.—Disappearance of general symptoms; persistence of the signs of cavity.
Duration.—Five months.

An English lady, Miss J., aged thirty-four, came to me in October, 1859.—Patient states that she has been ill for seven years, and has tried a multitude of treatments, especially cod-liver oil, tonics, bitters, steel, residence in warm climates, &c.

Disease not hereditary; at present considerable emaciation; extreme weakness; and dyspnœa so distressing that she is obliged to be carried up stairs. Cough very frequent and fatiguing; muco-purulent expectoration, about half a tumbler-full daily. Appetite completely lost; has night sweats; complains of pain in the left side of the chest, but still sleeps pretty well; fever at nightfall; pulse 110; no hæmoptysis; catamenia diminished in quantity, but appear very regularly; leucorrhœa; no diarrhœa; constipation. Patient suffers occasionally from attacks of hysteria, with considerable and very painful tympanitis; voice very weak; says that for several years past she has never ventured out of doors in winter, and in summer has only been able to take airings on a pony.

On examination, I noted as follows:—In front, imperfect inspiratory expansion of left side. On percussion, dulness above the left clavicle and below it for about four fingers' breadth; normal resonance on the right. On auscultation over the space corresponding with the dulness, cavernous respiration, with gurglings and pectoriloquy. On the right, respiration normal. Behind, incomplete rising of the left shoulder. Percussion dulness in the left fossa supra-spinata of the same side. Weak respiration in the fossæ supra et infra-spinatæ of left side. In the middle of intra-scapular region, strong bronchophony and blowing respiration. On the right, nothing abnormal.

Diagnosis.—Cavity in the left lung.

After following the specific treatment one month, patient was able to walk out, and resolved, in pursuance of my advice, to pass the winter in Paris. In three months all the general symptoms had disappeared, and she declared that she had never been in better health. She could go out on foot in all weathers, and walk long distances as well, if not better, than two younger sisters who had come to stay with her.

The local symptoms gradually improved, and in February, 1860, I considered her well enough to return home. At that time her general health was excellent; although naturally of a spare habit, she had grown stout; her strength had completely returned; the dyspnœa had disappeared; she had scarcely any cough, and the expectoration was limited to two or three sputa daily; appetite very good; no night sweats or thoracic pains; fever entirely ceased; pulse 80; menstruation regular; no diarrhœa; had quite recovered her voice.

Local signs.—Left side of thorax still expands imperfectly. On percussion, the same dulness on left side. On auscultation, the gurglings had disappeared, but there was still blowing respiration, with pectoriloquy, but no rhonchi even during the cough. No other abnormal sign. Just as the patient was about leaving, she had an attack of influenza with intense fever. On auscultation, signs of bronchitis of right lung; the same signs at posterior aspect of left; in front, also, abundant gurglings and cavernous respiration. The patient was confined to her bed for a week, by which time the symptoms of bronchitis had disappeared, but there still remained a few gurglings on the left side. These, however, gradually diminished, and in April the patient returned home. She then presented the same signs of excavation as noted in February, and in all other respects her health was perfect. During the journey home, the weather being very unfavourable, she had another attack of bronchitis, and on her arrival, was again obliged to take to her bed, to the great chagrin of herself and her friends, who, from her letters, had hoped to see her in perfect health. Appropriate treatment applied by the family physician, in accordance with my directions, soon removed the complication, and a fortnight after her arrival, she wrote to apprise me that her health was then just the same as when she left Paris. Notwithstanding the cold and wet summer (1860) which followed, she continued to enjoy excellent health, was able to go out in all weathers, without taking other precautions than are usual with delicate persons. She was even able to go into society, which previously she had not done for years.

Case XVI.

Previous duration.—Two years.

Symptoms.—Weakness; emaciation; night sweats; want of sleep; thoracic pains; difficulty in lying down; fever and rigors; dyspnœa; cough; expectoration; hæmoptysis; hoarseness; loss of appetite; vomiting.

Lesion.—Cavity occupying the two upper thirds of left lung; softening tubercles scattered over the rest of that lung, and over upper two-thirds of posterior aspect of right lung.

Result of Treatment.—Disappearance of general symptoms and of signs of softening on the right side; persistence of signs of excavation.

Duration of Treatment.—Nine months.

M. M., aged thirty.

January, 1860.—Disease came on two years since. Great weakness at present; considerable loss of flesh; moderate night sweats, but can get very little sleep; complains of very acute thoracic pains in right side; can scarcely lie at all on his left side; fever at nightfall, with rigors; pulse 120; much dyspnœa, and can hardly get up one flight of stairs; cough very frequent, with muco-purulent expectoration in moderate quantity; frequent hæmoptysis; voice hoarse; no appetite; occasional vomiting in the morning; no diarrhœa.

Local signs.—In front, diminished inspiratory expansion of left side; on the left, percussion dulness above the clavicle, as well as below, for about three fingers' breadth; diminished resonance over rest of lung. On auscultation, above left clavicle, cavernous respiration, with pectoriloquy. The same signs below, over the space corresponding with the dulness; still lower and down to base, scattered moist crepitations. On the right, coarse respiration above the clavicle, as well as below, for two fingers' breadth. Behind, the left shoulder rises imperfectly. Percussion dulness in the supra et infra-spinous fossæ of the left side; diminished resonance over remainder of same side, and in the right supra and infra-spinous fossæ. On auscultation, in the left supra and infra-spinous fossæ, cavernous respiration with pectoriloquy; moist cracklings down to base; on the right, moist crepitations in the supra and infra-spinous fossæ.

Diagnosis.—Cavity occupying the two upper thirds of left lung; softening tubercles disseminated over the rest of that organ and the two upper thirds of posterior aspect of the right. As this patient resided at a great distance from Paris, the treatment was not very strictly followed, and on two occasions serious inflammatory accidents placed him in imminent danger. Nevertheless, improvement took place rapidly, and after a few accidental drawbacks, it became permanent. In September, his general health had become very good; he had been able to resume his usual occupations without fatigue, though requiring long and frequent journeys. He had gained flesh, had no night sweats, slept well, had no thoracic pains, nor any difficulty in lying down; neither fever nor rigors; no dyspnœa; voice quite natural; appetite good; no vomitings. The only symptoms still remaining are a very slight cough in the morning, and some little expectoration, chiefly of a salivary character.

Local signs.—In front, incomplete inspiratory expansion of left side; percussion dulness above and below the left clavicle for about three fingers' breadth. On auscultation, over seat of dulness, blowing respiration, but no rhonchi even during cough; well-marked pectoriloquy; below, coarse respiration; on the right, normal respiration; behind, the left shoulder rises less than the right. On percussion, dulness in the left supra and infra-spinous fossæ. On auscultation, in the left supra and infra-spinous fossæ, blowing respiration, pectoriloquy, but no râles; lower down, coarse respiration; on the right, natural respiratory murmur.

I saw this patient again in March, 1861. The physical signs remained the same. He continued to enjoy perfect health, and had passed through the winter without even a cold. At the present moment (1863) he still continues in perfect health.

CASE XVII.

Previous duration.—Four years.

Symptoms.—Hæmoptysis; debility; emaciation; dyspnœa; night sweats; fever; rigors; cough; expectoration; dyspepsia; vomiting; occasional diarrhœa.

Lesion.—Excavation in left lung; softened tubercles in remainder of its front aspect, and at its posterior apex.

Result of Treatment.—Disappearance of general symptoms; persistence of signs of cavity.

Duration of Treatment.—Nine months.

Monsieur T., aged twenty-seven, unmarried.

January, 1860.—His mother died of consumption: has always been of very delicate health, so much so as to interfere with his education; hæmoptysis first occurred in 1856, and has returned several times since; symptoms of disease greatly aggravated within the last month; loss of strength has compelled him to desist from business; considerable emaciation; suffers so much from dyspnœa that he cannot walk upstairs; night sweats so profuse that he is obliged to change his clothes several times; occasional fever and shiverings in the evening; abundant muco-purulent expectoration, more than half a tumblerful daily; no appetite; digestion laborious, with frequent vomiting; occasional diarrhœa; pulse 120. The patient having stated that he was engaged to be married, and that the day was fixed at an early date, I advised him to postpone his engagement.

Local signs.—Incomplete thoracic expansion of left side. The patient bears the scar of an issue on left side. Considerable percussion dulness above, as well as below, the left clavicle for about three fingers' breadth; diminished resonance down to base; percussion resonance normal on the right side. On auscultation over the dulness, cavernous blowing, with numerous large gurglings; well-marked pectoriloquy; over remainder of lung, moist cracklings; on the right, normal respiration. Behind, on percussion, decreased resonance at apex of left lung; on auscultation, moist cracklings in the left supra-spinous fossa; coarse respiration in the rest of the lung; on the right, normal vesicular murmur.

Diagnosis.—Cavity in the left lung; softening tubercles over the anterior part of the same organ, below the cavity, and at the posterior apex.

After the patient began taking the hypophosphites, the improvement was so rapid that in a fortnight he was able to return to his business. By the month of March his health was so much improved that I thought there was no further objection to his marriage, which was celebrated on the 15th of that month.

By October, all the general symptoms have entirely disappeared. There is but very slight cough in the morning; the expectoration is reduced to a spoonful of phlegm; his strength has completely returned, and he is getting stout; night sweats have ceased; he has neither fever nor rigors; has no dyspnœa, and can attend to business as well as before his illness; he has a good appetite, digests well, and has neither vomiting nor diarrhœa; pulse 72. During the course of the treatment he had two or three slight attacks of hæmoptysis, which were stopped by emetics, and they have not returned now for several months. Marriage has had no unfavourable influence on his health, and he was never better in his life.

Local signs.—In front, incomplete inspiratory expansion of left side; dulness on percussion above the left clavicle, as well as below, for about two fingers' breadth. On auscultation over dulness, blowing respiration and pectoriloquy; a few large cracklings during cough; lower down, coarse respiration; posteriorly, no diminution of resonance on percussion, and the respiration is normal on both sides.

In April, 1861, the patient continued perfectly well, and his wife had presented him with a strong healthy boy.

In January, 1862, I again had an opportunity of examining this patient. He is in perfect health, has no general symptoms, and the only local signs remaining are, diminished resonance at left apex, with blowing respiration and bronchophony.

This patient was in good health in 1868.

CASE XVIII.

Previous duration.—Two years.

Symptoms.—Hæmoptysis; debility; emaciation; difficulty in lying down; sleeplessness; fever; dyspnœa; cough; expectoration; hoarseness; loss of appetite.

Lesion.—Cavity occupying the middle of the right lung; softening tubercles scattered over its anterior portion; tubercles at the left apex.

Result of Treatment.—Disappearance of general symptoms and of physical signs on the left side; persistence of signs of excavation.

Duration of Treatment.—Five months.

Mr. J., an English gentleman, aged 28, unmarried.

March, 1860.—Complaint not hereditary; began about two years ago with considerable hæmoptysis, which has recurred since nearly every week. Patient's strength so reduced that he can only walk a few steps; considerable emaciation; cannot lie on the right side, but has no thoracic pains; sleeps badly; fever in the evening; pulse 108; great digestive trouble; cough not very troublesome as long as he keeps still, but on the least exertion it comes on in fits and is very fatiguing; about half a tumblerful of muco-purulent expectoration daily; voice slightly hoarse; complete loss of appetite; no diarrhœa.

Local signs.—In front, imperfect inspiratory expansion of the right side; dulness on percussion, above and below the right clavicle for about three fingers' breadth; lower down, diminished resonance. On auscultation of the right side, coarse respiration above the clavicle, with bronchophony. Below, for a finger's breadth, large moist râles; still lower, cavernous blowing, with gurglings; cavernous cough and pectoriloquy; moist râles down to the base. On the left, a few dry râles above the clavicle, especially during forced inspiration; exaggerated respiration in the rest of the lung. Posteriorly, imperfect lifting of the right shoulder during inspiration. On percussion, diminished resonance over the whole of right side. On auscultation in the right supra-spinous fossa, coarse respiration with increased vocal resonance; the same coarse respiration over the whole of lung; in the middle of the intra-scapular region of the same side, imperfect pectoriloquy; normal respiration on the left.

Diagnosis.—Cavity occupying the middle part of right lung; softened tubercles over the rest of that organ in front; tubercles at the apex of left lung.

July, 1860.—His general condition has greatly improved, no symptoms now remaining but very slight cough in the morning with trifling expectoration (not exceeding half a spoonful). The attacks of hæmoptysis which at first occasionally recurred, but at more distant intervals, have ceased for two months past. Patient's strength has completely returned; he has also gained flesh; sleeps well, and has no fever nor dyspnœa; appetite very good; voice has recovered its natural tone; pulse 84.

Local signs as follows:—In front, the right side still expands less than the other; percussion dulness for three fingers' breadth below the right clavicle. In the same space, blowing respiration; pectoriloquy without gurgling; a few sonorous rattles during forced inspiration; respiration on the left side normal. Behind, diminished resonance at the upper part of right lung; on auscultation, pectoriloquy in the middle of intra-scapular region of right side, without other abnormal signs; nothing on the left. At this time, urgent business compelled the patient to leave Paris for England. From that time until 1863 I had not heard of him, but since then I was told (in 1871), by a person who knew him well, that he had continued in perfect health.

CASE XIX.

Previous duration.—Four years.

Symptoms.—Emaciation; debility; shortness of breath; cough; expectoration; fever; night sweats; sleeplessness; loss of appetite; vomiting; diarrhœa.

Lesion.—Cavity at the apex of left lung; softened tubercles over its anterior aspect and at its posterior apex; tubercles at apex of right lung.

Result of Treatment.—Disappearance of general symptoms, of stethoscopic signs of right side, and of signs of softening on left side; persistence of signs of cavity.

Duration of Treatment.—Five months.

An English officer, Lieutenant-Colonel K., fell ill four years ago. Disease not hereditary. He then made several long sea-voyages, remained some time in New Zealand, and improved somewhat while there. But towards the close of 1859, all the symptoms got much worse, and diarrhœa set in for the first time. Recourse was had to cod-liver oil and to steel, which had relieved him when first attacked, but now failed to arrest the progress of the disease. After much pressing, his physician consented to prescribe the hypophosphites; but whether they were improperly administered (the physician thinking them of no value, and merely prescribing them to satisfy his patient), or whether the preparations employed were impure, they also were productive of no benefit. Meanwhile, as the patient kept getting worse, he was induced by hearing of several cases which I had treated with success, to come to Paris and put himself under my care in April, 1860. He was then in the following condition: Considerable emaciation, which has made great progress, especially of late; strength much reduced; dyspnœa so distressing that he can hardly ascend to the first floor; cough very frequent and troublesome, particularly towards night, becoming incessant when the patient happens to be in a room where many persons are assembled. He is consequently unable to dine at a *table-d'hôte*, or to go to a reading-room. Muco-purulent and nummular expectoration amounting to about one-fourth of a tumblerful daily. Towards evening, fever, and occasional night sweats; sleeps badly, and has no appetite; vomits at times; no hæmoptysis; has been troubled with diarrhœa for the last two months.

Local signs.—Imperfect expansion of the ribs on the left side. In front, percussion dulness above the left clavicle, and below it for three fingers' breadth; diminished resonance in the rest of that side. On the right, dulness above the clavicle, as well as below it for three fingers' breadth. On auscultation above the left clavicle, cavernous respiration, with abundant gurglings during cough; well-marked pectoriloquy; same signs below the left clavicle and throughout the whole extent of the dulness; below, down to base, moist râles of varying size and intensity. In the upper third of right lung, large moist crepitation and bronchophony. Posteriorly, during inspiration, the left shoulder rises less than the right. Diminished percussion resonance at the apex of the left lung; moist crepitus in the left supra-spinous fossa; increased resonance of voice in supra-spinous fossa and the upper part of the inter-scapula region. Diminution of the respiratory murmur in the rest of this side. Exaggerated respiration on the right.

Diagnosis.—Cavity at the apex of left lung; softened tubercles in the remainder of its front aspect and its posterior apex; softened tubercles at apex of right lung.

The rapidly-increasing aggravation of the general symptoms, the digestive complications, and the great extent of the local lesions, rendered my prognosis of this case most unfavourable. Nevertheless, under the influence of the specific treatment, methodically employed, all the general symptoms rapidly improved. The diarrhœa disappeared, appetite returned, the fever and night sweats ceased, sleep returned, the intensity of the cough was considerably diminished, and in six weeks the patient was already in a very satisfactory state. On auscultation, the left lung still presented the signs of excavation, but the râles at the base had disappeared. On the right there were the same moist crepitations, but they were less distinct, and much less numerous. In three months and a half, though the improvement was much interfered with by the cold damp summer of 1860, the specific treatment gradually dispelled all the general symptoms, and in August of the same year I considered the patient cured. He then left Paris for a tour in Germany, and afterwards returned to England. His state then was as follows: He had gained flesh, and weighed six pounds more than before. He had no cough, except a very slight one in the morning to expectorate three or four small muco-purulent sputa floating in a clear salivary fluid. He had no difficulty of breathing, and his respiration was so easy that he was able to walk long distances. He visited all the public monuments without fatigue, and, as he told me, even went up to the top of the Arc de Triomphe without being as much out of breath as several friends who accompanied him. There was no fever nor night sweats. He slept well; his appetite was good; no vomiting, and the diarrhœa had entirely disappeared; in short, his general health was perfect.

Local signs.—Inspiratory expansion of left side still imperfect. Percussion dulness the same as at first on left side, but less on the right. On the left side, cavernous blowing without gurglings; well-marked pectoriloquy; dry crackling during cough; no râles nor crepitus. On the right side, below the clavicle, increased vocal resonance, but no rhonchi. Posteriorly, percussion and auscultation normal on both side.

I have since seen this patient twice, when passing through Paris. He was still quite well, had passed the autumn in England, and frequently gone out shooting. I saw him again in May, 1861. He had passed the winter well, had grown stout, and was never better. The left side still presented the same signs of a cavity. On the right side, respiration was quite normal. I had the opportunity of examining this patient in May last, 1862, and noted as follows:—

General health perfectly good; a little cough and expectoration in the morning only. On the right side, percussion and respiration, cough, and voice quite normal. On the left side, dulness on percussion, cavernous blowing and pectoriloquy above the clavicle, but no râles, even during cough. Below the clavicle, dulness on percussion for a finger's breadth, with blowing respiration and bronchophony. The above signs indicate a gradual contraction of the cavity of the left lung, and a permanent restoration of the right to its natural condition. Normal respiration in the rest of the lung.

This patient died four or five years afterwards in the South of France of an attack of bronchitis.

CASE XX.

Previous duration.—One year.

Symptoms.—Debility; emaciation; thoracic pains; difficulty in lying down; sleeplessness; night sweats; fever and rigors; dyspnœa; cough; expectoration; hoarseness; loss of appetite; indigestion; vomiting; occasional diarrhœa.

Lesion.—Cavity in the right lung, with softened tubercles in front.

Result of Treatment.—Disappearance of the general symptoms. Very great improvement of physical signs.

Duration of Treatment.—Four months.

An English gentleman, aged twenty-four, consulted me in June, 1860. Several of his family have died of consumption. Has always been in very delicate health. Pale complexion. His illness first came on about a year ago, but got much aggravated in March last. Has grown so weak that he can no longer ride on horseback, as he has always been accustomed to do. Considerable emaciation; complains of pain in the right side, and cannot lie on it; sleeps badly, and sweats so profusely that he is obliged to change his linen every night. Fever and rigors in the evening; pulse 120; considerable dyspnœa; coughs a good deal; voice very weak; has had no hæmoptysis; has no appetite; digestion difficult; frequent vomitings. For a month past has been troubled with diarrhœa.

Local signs.—Thorax much emaciated; imperfect expansion of the right side. Dulness on percussion over the whole of right side; normal resonance on the left. On the right, above the clavicle as well as below, for four fingers' breadth, cavernous respiration, with pectoriloquy; below, moist râles down to base. On the left, exaggerated respiration especially at the apex. Posteriorly the right shoulder rises less than the left. Percussion dulness in the right infra- and supra-spinous fossæ; diminished resonance throughout the rest of this side. Bronchophony in the supra-spinous fossa and in the inter-scapular region of right side; coarse respiration in the rest of the lung. Normal respiration on the left.

Diagnosis.—Cavity and softened tubercles in the front of right lung.

The treatment of this patient lasted four months. Within the first fortnight there was a decided improvement of all the symptoms, which continued without interruption till September. He had then recovered his colour, his strength had returned to such an extent that he could ride on horseback as well as before his illness. He had grown stout; the thoracic pains had disappeared as well as the sleeplessness and night sweats; no fever nor rigors in the evening; no dyspnœa; appetite good; digestion easy; no vomiting; no diarrhœa; a very slight cough in the morning without expectoration.

Local state.—Imperfect expansion of right side, and dulness on percussion. On the right side, the same cavernous respiration and pectoriloquy as before. A few dry cracklings during forced inspiration or coughing; but the rhonchi at the base have disappeared. Posteriorly, diminished resonance on the right side. The respiration of right side is considerably weaker than on the left, where it appears perfectly normal. Though this patient was not definitely cured, as he was most anxious to return home, I did not oppose it, and he accordingly left Paris. I have heard from him since, and in January, 1861, he continued to enjoy good health.

Case XXI.

The four following cases are from my first year's dispensary patients (64):—

The reports have been considerably abridged from the original, in the Second Edition of my French work, which contains the notes as they were taken, at least every week.

Previous duration.—Seven months.

Symptoms.—Weakness; fever; cough; expectoration; hæmoptysis; night sweats; dyspnœa; loss of appetite.

Lesion.—Softened tubercles occupying the whole surface of the right lung before and behind; formation of an excavation during treatment.

Result of Treatment.—Improvement of the physical signs, and almost complete disappearance of the general symptoms; persistence of signs of excavation.

Duration of Treatment.—Nine months and a half.

Auguste F., aged eighteen, unmarried, an architect.

November 15, 1858.—Habit of body evidently tubercular; cheeks red; complexion transparent pearly conjunctiva. Says he has grown a great deal of late; has been ailing for seven months past; his strength diminished considerably at first, but has returned a little recently; has not lost much flesh, having always been of a spare habit; has fever occasionally in the evening, but no rigors; cough frequent, especially in the morning; muco-purulent expectoration not very abundant; has vomited blood twice, the first time only a little, but the last time, on September 26, he threw up a considerable quantity of clotted blood through the mouth and nose; the night sweats, which were very abundant, especially after the hæmoptysis, have diminished within the last week; has no difficulty in lying down; sleeps well; dyspnœa moderate; tracheal râle audible at a distance; appetite capricious, does not vomit, and digests well; bowels regular; has ceased attending to business for three months, but returned to it again on June 1, but is obliged to remain in an office and cannot go out; has been taking cod-liver oil for five months; and for the last month, the hypophosphite of soda. Pulse 144, regular.

Local signs.—Percussion dulness above the right clavicle, as well as underneath for about four fingers' breadth. On the left side, below the clavicle, coarse breathing with jerky inspiration; on the right, above the clavicle, blowing respiration, with small gurglings which increase greatly during cough, considerable resonance of voice; below the clavicle, numerous moist râles; imperfect pectoriloquy; same signs over the whole space corresponding to the dulness; the respiratory murmur is not perceptible higher than three fingers' breadth below the clavicle, and down to base it is mixed with moist râles and dry crepitus; vocal resonance much increased. Posteriorly, percussion dulness in the right supra-spinous fossa and the whole corresponding intra-scapular region; decreased resonance in the infra-spinous fossa of the same side. In the left supra-spinous fossa, respiration weak; nothing abnormal in the rest of the lung; on the right side, in the supra-spinous fossa, fine mucous rattles, almost completely replacing the respiratory sound, and increasing during cough; bronchophony; the same signs in the fossa infra-spinata, in the intra-scapular region and throughout the whole extent of the lung, except just at the base, where the respiratory murmur is very weak.

Diagnosis.—Softened tubercles throughout the whole extent of right lung, both before and behind. Probably crude tubercles at apex of left.

Treatment.—Hypophosphite of soda, gr. viij. daily.

November 22.—Patient is rather better, the night sweats have ceased; the fever is less. The appetite has improved, and the cough somewhat diminished. Pulse 130, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. xvj. daily.

November 29.—Cough continues to diminish. The sweats returned during five or six nights, but ceased again last night; appetite remains the same; dyspnœa somewhat relieved; no fever; last night had slight epistaxis; pulse 130, regular, moderately full.

Treatment.—Hypophosphite of lime, gr. viij. daily.

December 6.—Expectoration decreased; no sweats for the last two nights. Fever still comes on from time to time, but is less frequent and less intense; sometimes passes a day without any; appetite good; pulse 148.

Treatment.—Hypophosphite of lime, gr. xvj. daily.

December 15.—Cough diminished; strength remains the same; appetite continues good; the tracheal râle still audible at a distance; pulse 120, regular, moderately full.

December 29.—No night sweats nor fever; dyspnœa has decreased; he expectorated one bloody sputum some days ago; appetite good. Pulse 140, rather irregular and small.

Treatment.—Hypophosphite of soda, gr. viij. daily, after suspension for two days.

January 10, 1859.—Free from fever and night sweats; cough and expectoration moderate.

Treatment.—Hypophosphite of soda, gr. viij. daily.

Same treatment after four days' suspension.

January 28.—Has again sweated a little this week, with slight epistaxis. Pulse 120, regular, moderately full.

Treatment.—Cupping at the base of the thorax.

February 11.—Coughs very little, and only in the morning; has had night sweats once during the week; pulse 140; rather irregular, and weak.

Local signs.—In front, on percussion, considerable dulness above the right clavicle, and below for a space of three fingers' breadth; still lower down, the resonance is pretty good, though less than on the opposite side. On auscultation on the left, one or two cracklings only after deep inspirations; no resonance of voice nor of cough; at the base, jerky respiration; on the right side, above the clavicle, blowing respiration, with small gurglings; imperfect pectoriloquy; gurgling during cough; below the clavicle, very numerous fine cracklings; distant pectoriloquy; a little gurgling during cough; the same signs almost down to base, except the vocal resonance. Posteriorly, percussion dulness over the whole of right side. In the left supra-spinous fossa, slightly increased vocal resonance, without râles or cracklings; respiration rather weak in the rest of the lung; on the right side, in the supra-spinous fossa, fine crepitant râles; prolonged expiration; the same sign in the upper part of the interscapular region and in the infra-spinous fossa down to the base.

Treatment.—Hypophosphite of soda, gr. viij. daily.

February 28.—Patient scarcely coughs at all, and expectorates very little (about half a spoonful daily); has no night sweats; strength and appetite good; slight dyspnœa; pulse still 112, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. daily, after suspension for four days.

March 18.—Very little cough; scarcely any expectoration: very slight dyspnœa; no night sweats; appetite good; pulse 120.

Treatment.—Hypophosphite of soda, gr. viij. daily, after suspension for four days.

March 28.—Improvement continues; now works eight hours a day, and can attend to out-door business; has not lost flesh; pulse 100, irregular. Same treatment.

April 20.—Is going on well, and now complains of nothing but slight dyspnœa; pulse 120.

Same treatment, after suspension for four days.

May 2.—No night sweats; strength good; hardly any cough, and very little dyspnœa, but for some days past his appetite has fallen off.

Treatment.—An emetic.

May 11.—Appetite has returned; pulse 120.

Treatment.—Hypophosphite of soda, gr. viij. every other day.

May 30.—Hardly any cough; says that he has grown a good deal since he began my treatment; epistaxis occurred the day before yesterday. No medicine.

July 15.—Patient continues to improve, but the cough has slightly increased; he has had night sweats and epistaxis; pulse 120, regular, and moderately full.

On examination the following was noted:—Very marked depression of the right side, with imperfect expiratory expansion. Anteriorly, on percussion, cracked pot sound above the right clavicle; below, dulness for a space of three fingers' breadth, with diminished resonance over the remainder of lung. On auscultation, above and below the left clavicle, rather coarse respiration; voice natural: no râles nor cracklings. On the right, above the clavicle, cavernous respiration; very numerous fine gurglings; well-marked pectoriloquy; the same below, gurglings in upper three-fourths of lung; coarse and prolonged respiration in the lower fourth. Posteriorly, dulness over the whole of scapular region. On the left, in the supra-spinous fossa, a few cracklings, which increase during cough, and are then accompanied by a few sibilant rhonchi; respiration rather weak in the infra-spinous fossa. In the right supra-spinous fossa, cavernous respiration, numerous fine gurglings, increased during cough; well-marked pectoriloquy. The same signs in the infra-spinous fossa and the inter-scapular region, except quite at the base.

August 22.—Improvement maintained; good appetite; strength satisfactory; pulse 96, regular, moderately full.

Treatment.—Resume the hypophosphite, in doses of gr. viij. daily. This was the patient's last attendance at the dispensary, as he considered himself well, but in January, 1860, he was seen by one of my pupils, and was then following his ordinary avocations, the only symptom left was a little cough.

CASE XXII.

Previous duration.—Eight years.

Symptoms.—Cough; expectoration; debility; emaciation; fever and rigors; night sweats; difficulty in lying down; loss of appetite; vomiting.

Lesion.—Softened tubercles at apex of left lung; tubercles scattered over the rest of both lungs; formation of a cavity during the treatment.

Result of Treatment.—Persistence of signs of excavation; almost total disappearance of the general symptoms.

Duration of Treatment.—Thirteen months, with interruptions.

J. G., a shopman, unmarried, aged twenty-seven.

April 23, 1858.—Has been coughing for eight years past, little in summer, but more in winter. During the last week has got much worse; the cough is much more frequent with abundant muco-purulent expectoration; has never had hæmoptysis; for the last two months has felt his strength gradually decline, and has lost much flesh within the year; has fever and rigors, with profuse night-sweats; sleeps tolerably well, but cannot lie on his back; suffers from dyspnœa when walking;

has no appetite and vomits, but his digestion is pretty good; neither diarrhœa nor colics; has continued attending to business; pulse 88, strong and full.

Local signs.—In front, on percussion, diminished resonance below the left clavicle for about two fingers' breadth. On the left side above the clavicle, coarse respiration and exaggerated resonance of voice; below, coarse respiration, with prolonged expiration for about four fingers' breadth; lower still, numerous dry crepitus down to base; increased resonance of voice. Normal respiration on the right side, except a few dry crepitus at the base. Posteriorly, percussion, resonance slightly diminished on the left side, with numerous moist râles throughout the whole lung. On the right side, similar râles at base. Considerable resonance of voice in the supra-spinous fossa.

Diagnosis.—Softening tubercles at the apex of left lung, and scattered throughout both lungs; with intercurrent bronchitis.

Treatment.—An emetic.

April 26.—Cough somewhat relieved.

Treatment.—A potion with antimonii oxysulphuretum.

June 11.—Cough increased.

Treatment.—Hypophosphite of soda, viij. gr. daily.

June 21.—Cough the same; expectoration slightly increased, but appetite has become very good; pulse 72, regular and full.

Treatment.—Hypophosphite of soda, xvj. gr. daily.

June 30.—Feels better; cough less troublesome; pulse 76, regular and full.

Treatment.—Hypophosphite of soda, viij. gr. daily.

July 19.—Continues to improve.

August 20.—Has left off the treatment for a week, since which cough has become much worse, with increased dyspnœa.

Treatment.—Hypophosphite of soda, xvj. gr. daily.

August 30.—Cough again diminished, and patient going on well; pulse 60, regular. Same treatment.

October 8.—The patient has again ceased coming to the dispensary, and has left off the treatment since the 10th of last month, considering himself well, as he had passed a week without coughing once; since then, however, the cough has again become frequent, and the dyspnœa much increased. He has now abundant tracheal râle, audible at a distance. Pulse 88.

Treatment.—Hypophosphite of lime, viij. gr. daily.

October 20.—Expectoration more abundant, but easier; the tracheal râle still audible. Pulse 72, rather weak.

Local state.—Complete percussion dulness above the left clavicle, and below for about three fingers' breadth. Imperfect inspiratory expansion of left side of thorax. On left side, above the clavicle, cavernous respiration; numerous gurglings during cough; pectoriloquy. Below the clavicle, a mixture of moist and dry cracklings; friction sound; increased resonance of voice and cough; dry cracklings throughout the rest of lung. On the right side above the clavicle, sub-crepitant râle during expiration; same signs below the clavicle for about two fingers' breadth; increased vocal resonance over the same space. Below, coarse respiration and increased vocal resonance. Posteriorly, on percussion, diminished resonance in the left infra-spinous fossa. On auscultation, on the left, in the supra-spinous fossa, large moist rhonchi, increasing during cough; increased resonance of voice and cough; same signs in the infra-spinous fossa; at the base, friction sound, with increased vocal resonance and numerous moist rhonchi; gurglings during cough; same signs in the axilla. On the right, in the supra-spinous fossa, weak respiration, with slight vocal resonance.

This examination fully confirms the diagnosis of April 23, and also shows that, in the interval, an excavation has formed at the apex of left lung.

Treatment.—Hypophosphite of soda, xvj. gr. daily.

October 25.—Has coughed less; the expectoration is muco-purulent, not very abundant, and frothy; the dyspnœa has diminished; pulse 96, regular, moderately full.

℞ 1. Sodæ hypophos., gr. xvj. daily.
2. Syrup ipecac., ℥ij.

A tablespoonful every other day.

November 24.—Cough more frequent; pulse 96, regular, but rather weak.

Treatment.—Hypophosphite of soda, gr. viij. daily.

December 1.—Cough and expectoration do not diminish; tracheal râle still audible, even at a distance; no night sweats, pulse 84.

Treatment.—Hypophosphite of lime, gr. xvj. daily; an emetic.

December 10.—The difficulty of breathing has diminished, but the cough has undergone no change; pulse 72, regular, moderately full. Same treatment after four days' suspension.

December 22.—The râle has diminished; pulse 80, regular, moderately full. The specific treatment to be continued at the same doses.

January 5, 1859.—The cough continues moderate; no night sweats; pulse 96, regular, but weak.

Treatment.—Hypophosphite of lime, gr. viij. daily.

January 17.—Says he is getting on well; the cough and difficulty of breathing moderate; appetite good; neither night sweats nor fever; tracheal râle still audible; pulse 88, regular, and moderately full. The same treatment.

February 9.—Says he now coughs but very little. Treatment as before, after five days' suspension.

February 28.—Cough still of rare occurrence; little expectoration; no night sweats; has ceased losing flesh; breath still rather short; pulse 60, regular, and moderately full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

March 16.—Patient continues to do well, strength and appetite both good, and coughs very little; pulse 72. Treatment as before.

September 12.—Still continues well, and coughs but seldom; pulse 60, regular, and moderately full.

Treatment.—Hypophosphite of soda, gr. viij. every other day.

October 17.—Continues well; pulse 60, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

January 9, 1860.—General symptoms have all disappeared; says he is able to attend to business as well as before his illness; pulse 80, regular and full.

March 12.—General state still continues satisfactory; pulse 84. On auscultation, in front, on the left, blowing respiration; a few cracklings after the cough; imperfect pectoriloquy. Behind, on the same side, a few dry rhonchi. On the right side, both before and behind, normal respiration.

Treatment.—Hypophosphite of soda, gr. viij. daily.

From this date the patient ceased to attend the dispensary, but he was seen in February, 1861. Except a little cough in the morning, he was then perfectly well; had recovered his strength and flesh, and had become an omnibus conductor. He says that he has left off attending the dispensary because he feels quite well, and cannot spare time to do so.

Case XXIII.

Previous duration.—Two years.

Symptoms.—Disease hereditary; great weakness; emaciation; fever and rigors; night sweats; thoracic pains; sleeplessness; great dyspnœa; cough; expectoration; hæmoptysis; vomiting; dyspepsia; colics; occasional diarrhœa.

Lesion.—Excavation, occupying nearly the whole extent of right lung.

Result of Treatment.—Persistence of physical signs of excavation; complete disappearance of general symptoms.

Duration of Treatment.—Five months and a half.

André V., married, a carriage polisher, aged forty-four.

June 16, 1858.—His father died of bronchitis, and a brother and sister of scrofulous affections. His present complaint came on about two years ago, but all the symptoms have become much worse within the last six months. The weakness has greatly increased, and he has lost much flesh; has fever in the evening, sometimes preceded by shiverings. Sweats profusely at night; complains of pains between the shoulders, but has no difficulty in lying down. Sleeps badly. Is very short of breath, and has a tracheal rattle audible at a distance. Cough frequent, with abundant muco-purulent expectoration. Has spit blood three or four times, but in small quantities. Epistaxis seldom occurs now, though at one time very frequent. Appetite has been rather better for some time past. Vomiting frequent a month or two ago, but not so much so now; not more than three or four times a week. Digestion laborious. Frequent colics. Was troubled with diarrhœa for six weeks at the commencement of his illness, but it has ceased for the last three months. He has not been able to work since last December; pulse 86.

On examination, I noted as follows:—The patient presents numerous cicatrices of suppurated cervical glands; imperfect expansion of thorax, especially on the right side; well marked percussion dulness, below the right clavicle, for about three fingers' breadth; supra-clavicular dulness also well marked. On the left side, below the clavicle, a few cracklings almost masked by the tracheal râle. No resonance of voice or cough. On the right, below the clavicle, and on the inner side, very coarse and blowing respiration, with considerable resonance of the voice

August 9.—Strength improved; pulse 80, regular, and rather full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

August 16.—Has again had hæmoptysis; pulse 84, regular, rather full.

℞.—Ergotinæ, gr. xvj. daily.

August 20.—The hæmoptysis has ceased after two days; still expectorates a good deal, but his strength continues to increase; pulse 80.

℞.—1. Calci hypophos. gr. ijss. daily.
2. Aluminæ hypophos. gr. $\frac{1}{2}$ daily.

September 13.—About two ounces of muco-purulent expectoration daily; night sweats have almost ceased; appetite, good; pulse 80, regular, rather full.

Treatment.—Hypophosphite of soda, gr. ij. daily.

September 27.—Has had diarrhœa for the last three days after fatigue at work; pulse 80, regular, rather full.

℞.—Bismuth subnitrat. ℈ ijss.
Extract. opii. gr. j.

October 6.—The diarrhœa has ceased for the last five or six days; but he has caught cold at work, and now coughs more; no night sweats; no vomiting; appetite, good; pulse 80, regular, rather weak.

℞.—1. Sodæ hypophos. gr. viij. daily.
℞.—2. Antimon. oxysulphuret., Extract. opii. ää gr. jss.
Ft. pilul. v. One every night.

October 22.—No treatment for the last ten days; for the last week has coughed and expectorated rather more, but has no night sweats, and appetite is good. Is now able to work ten hours a day. Pulse 80, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

November 5.—Pulse 72, regular, moderately full.

Local signs.—In front, scarcely any inspiratory expansion of the right side of thorax. On percussion, dulness above the right clavicle, and below for three fingers' breadth. On auscultation below the left clavicle, weak respiration. On the right, above the clavicle, cavernous respiration; well-marked pectoriloquy; great resonance of cough; a few gurglings. Below the clavicle, distant cavernous respiration; no gurglings; slight resonance of voice and cough. In lower two-thirds, respiration rather

coarse. Posteriorly, complete dulness in the right s
fossæ. In the left supra-spinous fossa, one or two sibilant
a few distant cracklings, without resonance of voice or
In the right supra-spinous fossa, very coarse respiration,
ance of voice and cough. In the infra-spinous fossa,
respiration; cracklings during cough, loud cavernous resp
without gurglings; cavernous cough; imperfect pectoril

Treatment.—Hypophosphite of soda, gr. viij. daily.

December 15.—The improvement continues. He
able to work at the Opera Comique as a scene-shifter,
often happens, he says, that he has to go up to the sevent
five or six times a day with a hundred-weight on his ba
to work late at night. Pulse 96, regular, moderately fu

The same treatment.

January 14, 1859.—Having overworked himself, the
and expectoration have increased. When he first came
dispensary, he weighed 102 lbs; he now weighs 108.
most robust he never weighed above 114 lbs. Pulse 84.

Treatment.—An emetic.

February 18.—Complains of a pain in the left side. Pu

Treatment.—A blister to seat of pain.

February 23.—The pain has not yet disappeared; c
more, and has had slight epistaxis. On auscultation ove
of pain, friction sound; bronchial respiration; and inc
vocal resonance.

Treatment.—Extract. aconit. gr. ij. every night.

February 25.—The pain has diminished, and, in oth
spects, he says that he feels quite well.

Extract. aconit. gr. iv. daily.

March 16.—He feels well, and says that he has been al
go up ten floors six times in the same day with a weight o
lbs. Appetite very good; scarcely coughs at all, and ha
dyspnœa. Is gaining flesh, but complains of rheumatic
in the back and loins. Pulse 72. No treatment.

April 27.—Still coughs and expectorates a little. Puls
regular, moderately full.

Treatment.—An emetic. Hypophosphite of soda, gr.
daily.

May 25.—Says he expectorates rather abundantly On
cultation, in front, on the right, moist râles at base, with
creased vocal resonance. Pulse 80, regular, moderately ful

Treatment.—Hypophosphite of soda, gr. viij. daily.

June 27.—Complains of general uneasiness and has had slight hæmoptysis; but nevertheless, feels tolerably well. Pulse 72.

Treatment.—An emetic.

July 11.—Is again doing well. Pulse 84, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. for two consecutive days, after an interval of three days.

September 26.—He continues well. Pulse 72, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. every three days.

October 24.—Is now perfectly well, except slight cough.

Treatment.—Hypophosphite of lime, gr. viij. twice a week.

February 20, 1860.—Has expectorated about a wineglassful of blood; but the hæmoptysis has now nearly ceased. Pulse 76.

Treatment.—An emetic.

April 16.—Patient complains of piles; had never had them before. Has now returned to his old trade of polishing.

Treatment.—Hypophosphite of soda, gr. viij. every four days.

May 21.—*Local signs.*—Well-marked depression of the right sub-clavicular region. Diminished inspiratory expansion of right side. Percussion dulness above the right clavicle; below less marked, but still evident diminution of resonance for three fingers' breadth. On the left side, normal respiration throughout the whole extent of lung. In the right supra-clavicular region, cavernous respiration without râles or crepitus; imperfect pectoriloquy. In the sub-clavicular region, blowing respiration with increased vocal resonance, but no râles nor rhonchi. The apex of the heart beats just below the right nipple, between the fifth and sixth rib. Heart sounds normal. Behind, the right shoulder, during inspiration, rises less than the left. Diminished percussion resonance over the whole extent of the right side. Respiration normal in every part of the left side. In the right supra-spinous fossa and the inter-scapular region, cavernous respiration, with bronchophony and great resonance of cough, but no râles nor crepitus of any kind.

January 1861.—The patient continues to enjoy good health, and works at his first trade of carriage polisher. He still continues the specific treatment in prophylactic doses.

1862.—I have not seen this patient of late, but know that he continues in perfect health.

I saw this patient as late as 1869. He continued in perfect health; had lost his first wife and had married a second.

CASE XXIV.

Previous duration.—One year.

Symptoms.—Disease not hereditary; weakness; emaciation; night sweats; pain in the side; dyspnœa; cough; expectoration; hæmoptysis; amenorrhœa; leucorrhœa.

Lesion.—Excavation in the right lung; softened tubercles in the left.

Result of Treatment.—Persistence of signs of excavation; complete disappearance of the general symptoms and of the signs of lesion on the left side.

Duration of Treatment.—Three months and a half.

Stephanie B., a sempstress, married, aged twenty-five.

August 11, 1858.—The disease is not hereditary; it began about a year ago while pregnant; since then patient has lost much strength, and has grown very thin; she has neither fever nor rigors, but profuse night sweats; complains of pains in the side, but finds no difficulty in lying down, and sleeps pretty well; has great dyspnœa; cough frequent; muco-purulent not very abundant expectoration; had a slight attack of hæmoptysis about a month ago for the first time; appetite good; has no vomitings, and digests well; no epistaxis; never had diarrhœa, but suffered from colic the day before yesterday; catamenia have not appeared since her confinement in January last; now has abundant leucorrhœa; has not been able to work for three months past; pulse 120, regular.

Local signs.—Percussion dulness below the right clavicle for about two fingers' breadth. Coarse respiration in left lung above and below the clavicle, with a little dry crepitus; resonance of voice and cough; above the right clavicle, loud blowing respiration, with considerable resonance of voice and cough; below the clavicle, blowing respiration, with prolonged expiration, accompanied by moist crepitus; great resonance of voice and cough; in the rest of the lung, coarse respiration, with prolonged expiration. Posteriorly, diminished resonance throughout the whole of the right side, especially marked in the supra-spinous fossa. In the left supra-spinous fossa, coarse respiration, with dry crepitus greatly increased during cough; in the infra-spinous fossa, moist crepitus still more abundant, with increased resonance of voice, and cough; at the base, coarse respiration; in the right supra-spinous fossa, cavernous respiration; well-marked pectoriloquy; in the inter-scapular region, small gurglings and pectoriloquy; moist crepitus in the upper two-thirds of the lung; coarse respiration at base.

Diagnosis.—Softened tubercles in the left lung; excavation and softened tubercles in the right.

Treatment.—Hypophosphite of soda, gr. viij. daily.

August 18.—Says cough and expectoration are less; her strength is returning; feels rather less dyspnœa; appetite continues good, but night sweats are still abundant; the catamenia have made their appearance for the first time for the last seven months, and lasted for five days. Pulse 88, regular, rather full.

August 25.—Her strength much increased, and has been able to resume work; appetite good, but the night sweats still as abundant; also complains of headache; pulse 120.

Treatment.—Hypophosphites of soda, gr. iv. daily.

September 1.—Night sweats have diminished; now only coughs a little in the morning; headache has ceased; has worked daily for the last week without feeling fatigue; pulse 96, regular, rather full.

Treatment.—Hypophosphite of soda, gr. iij. daily.

September 13.—Cough has slightly increased of late; night sweats have ceased; is stronger, and has less dyspnœa; is expecting the catamenia; leucorrhœa less abundant; she continues to work; pulse 104.

Treatment.—Syrup of ipecacuanha, ℥ij., a tablespoonful at a time.

September 15.—Night sweats have not returned, and she says she now feels no shortness of breath; pulse 96, regular, rather full.

Treatment.—Hypophosphite of soda, gr. v. daily.

September 24.—Scarcely coughs at all, and expectorates but little; has no dyspnœa nor night sweats; catamenia have appeared abundant, but were accompanied with slight hæmoptysis, so that she has ceased working; leucorrhœa has decreased; pulse 88, regular and rather full.

Treatment.—Hypophosphite of soda, gr. iij. daily.

October 6.—Scarcely any cough or expectoration remaining; appetite good; leucorrhœa now very trifling; she works about six hours a day; pulse 88, regular, rather full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

October 22.—Patient says she is well, and now works ten hours a day; pulse 76, regular, rather weak.

Treatment.—Hypophosphite of soda, gr. viij. daily.

November 3.—The improvement continues; patient can work without fatigue; pulse 96, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

November 15.—Never coughs now, she says, nor perspires at night; pulse 96.

On examination the following was noted: Marked dulness above right clavicle; above the left clavicle, blowing expiration, bronchophony, and resonance of cough; same signs below, but less marked and without the blowing. Above the right clavicle, same phenomena as on the left, but less marked. Below the clavicle, a little dry crepitus; no resonance of voice or cough; coarse respiration and prolonged expiration through nearly the whole extent of lung. Posteriorly, diminished resonance in the right supra-spinous fossa, still more marked in the inter-scapular region of the same side. In the left supra-spinous fossa, coarse respiration without resonance of voice or cough; no râles or crepitus. On the right side, in the upper part of the inter-scapular region, cavernous respiration with pectoriloquy; no râles or crepitus of any kind. These signs are perceptible over an extent of about three fingers' breadth; below, coarse respiration and prolonged expiration, without râles or crepitus.

Treatment.—Hypophosphite of soda, gr. viij. daily, after a suspension of five days.

November 29.—Has had her feet cold and has coughed more for some time, but within the last two days the cough has almost ceased; still expectorates a little in the morning; catamenia now appear regularly, and she works ten hours a day; pulse 100, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

December 20.—Catamenia have come well, and lasted for three days; her appetite is good, and strength still increasing; pulse 84, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

January 30, 1859.—Scarcely any cough; appetite good; no night sweats; is now quite strong, and works all day; pulse 60, regular, rather weak.

Treatment.—Hypophosphite of soda, gr. viij. daily, after a suspension of eight days.

February 9.—Improvement still continues; no general symptoms left; can work ten or twelve hours a day; pulse 80, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. every other day.

March 7.—Continues well, and is gaining flesh; pulse 96. The same treatment.

March 28.—Same satisfactory state; pulse 96, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. v. every three days.

April 27.—Is quite well, she says, and works all day; pulse 72, regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. daily.

May 30.—Is going on quite well; pulse 96.

Treatment.—Hypophosphite of soda, gr. viij. every three days.

October 3.—The improvement continues. No treatment.

January 9, 1860.—Going on well. Pulse regular, moderately full.

Treatment.—Hypophosphite of soda, gr. viij. once a week.

May 7.—No general symptoms.

Treatment.—Hypophosphite of soda, gr. iv. every six days.

September 24.—Has no cough, and says she is quite well.

February, 1861.—Has passed the last severe winter in perfect health. Is now seven months advanced in pregnancy, and there is every reason to believe that her confinement will be as favourable as in the normal state. She continues to take the hypophosphites in prophylactic doses.

The patient was confined of a healthy child in May, 1861, was able to get up a week after, and has continued ever since in perfect health, although working fifteen hours a day.

June 24, 1861.—The following was noted on examination: On the left side, percussion and auscultation sounds, both normal before and behind. On the right, percussion dulness above the clavicle, diminished resonance below with prolonged expiration, and increased resonance of voice and cough. Posteriorly,

dulness on percussion in the spinous fossæ, and in the interscapular space; blowing respiration, with bronchophony, no râles nor crepitus. The patient at this date (June, 1862) still continues to enjoy perfect health. She takes the hypophosphites occasionally, because, she says, that without them she cannot do the same amount of work as with them.

515 A. Cases with results similar to the preceding, either in the same stage or in the first or second, might be added in any number, but I prefer leaving room for the reports of other observers.

REPORTS OF CASES TREATED WITH THE SPECIFIC REMEDY BY OTHER PHYSICIANS.

516. I MIGHT find occasion for various remarks upon several of the cases which follow, and upon some of the details of treatment. As my experience has grown more enlarged I have become more alive to the necessity of endeavouring to direct all the details of treatment with the same minuteness and accuracy as those of a prolonged experiment in chemistry or physiology. It is only thus we shall attain, in therapeutics, the same positive and permanent results as in those sciences which constitute the ground-work of medicine. Much has been done, in this way, in the study of the symptoms of disease, but treatment of it is still nearly in the same chaotic state as when anatomy, physiology, and chemistry were almost as dreamy as astrology. Although, therefore, many points could at present be shown where the treatment, in the following cases, might have been better managed, every one who has a practical acquaintance with therapeutics will be surprised that so much has been done, and done so well, that there should be such a concordance of results, both symptomatic or temporary and curative or final, among observers so widely separated from one another, most of

them with no other guide than their general habits of clinical observation. The skill, the delicacy of medical tact shown in many of these reports, leave room to regret that more of them have not been fully detailed, and that so many observers, who have given but a few cases as examples of their practice, have not published a larger number. It augurs well for the future of therapeutics, that such results should be attainable even under all the counteracting tendencies of our present state of ignorance and the absurd teachings of the present schools (468, 484 A).

Case XXV.

517. The following case was published by Dr. Santa Maria, of Madrid, in the 'Iberia Medica,' No. 71 :—

A girl of eight years old had been suffering for three months from pulmonary phthisis in the second stage. During this time she had been treated by two physicians with the usual remedies, but without any favourable result. When called to see her Dr. Santa Maria found there was great pallor and emaciation, troublesome cough frequently followed by vomiting; expectoration of green opaque matter, fever at night, and such great difficulty of breathing that the patient could only sleep in a sitting posture; profuse night sweats and great restlessness; dulness and moist crepitus under both clavicles. Dr. Santa Maria ordered the blisters which had been applied to the patient to be dried up, gave her nutritious food in small quantity, and prescribed nothing but the hypophosphite of soda. This treatment was followed by rapid and permanent recovery.

Case XXVI.

517 A. Dr. Vicente Gomez y Orland, surgeon to the Military Hospital of Valencia, published the following case in the 'Actualidad' of that city ('Iberia Medica,' No. 72, March 30, 1858):—

A country labourer, aged twenty-four, born of consumptive parents, was drafted into the army in 1854, began to cough in April, 1855, and after different alternations in the complaint, entered the hospital at Valencia in October, 1858, with the following symptoms. Great prostration, small and quick pulse, difficulty of breathing, cough, and expectoration of tenacious mucus. Dulness, on percussion, at the apex of both lungs; bronchial respiration; increased action of the heart.

The patient was treated with cod-liver oil, bark, milk, and Iceland moss. But the disease continued to progress; the expectoration increased and became purulent; the cough more continuous, particularly at night. This was followed by irregular pulse, fits of shivering, ending in fever and perspiration; diarrhœa set in, and œdema of the legs. The dose of cod-liver oil was increased, and different balsams were added, but with no better effect. The patient got so low that the *last sacraments were administered to him.* A consultation of the medical staff of the hospital was held, and it was decided to try the hypophosphite of soda and nothing else. On January 4, 1859, the seventy-first since his entry into the hospital, he took ten grains of hypophosphite of soda. On the eighth day of this treatment the diarrhœa had increased, but the expectoration had diminished one-half, the fever fits became much shorter, and the patient had greatly improved. On the fortieth day after beginning the specific treatment, the expectoration and diarrhœa had ceased, and the patient was in a complete state of convalescence. The dose of the hypophosphite was then diminished, and finally left off on February 20, when there was nothing the matter with the patient but a certain degree of weakness.

518. The four following cases were published by Dr. Aureliano Maestre de San Juan, Professor of Clinical Medicine in the University of Grenada, in the 'Iberia Medica,' No. 74, Madrid, 1858:—

CASE XXVII.

(1) A blacksmith, aged thirty-two, whose family were consumptive, had suffered from pleuritic pain when twenty years of age, since when he had kept a slight rather harassing cough and has been liable to catch cold. Four months ago he had an attack of bronchitis, owing to having been chilled while in a state of perspiration, and since then has suffered from a dry cough, pain between the shoulders, shortness of breath attending any exertion, and has been unable to follow his trade. On his admission into the Clinique of the medical school the follow-

ing symptoms were noted:—'Marked emaciation; patient is pigeon-breasted; with high shoulders and a long neck; his colour is pale and earthy, with the exception of a vivid circumscribed redness of the cheeks; great pain in attempting to lie on the left side. Percussion showed dulness under both clavicles, particularly the left, on which side the motion of the ribs is less strongly marked during respiration, and vocal vibration, as perceived by the hand, more strongly marked than on the opposite side. At the apex of the right lung there was very prolonged inspiration, with sub-crepitant rhonchus; on the left side the sub-crepitant rhonchus was not confined to the apex, but heard over a much wider extent, and was more strongly marked. Below, throughout the rest of the lung, breathing was harsh and blowing. The cough was frequent, troublesome, recurring with violent fits, much increased during the night. The expectoration was greenish and opaque. The patient complained of a pain in his shoulders and at the top of the left lung. Little appetite, thirst, small and frequent pulse, hectic fever every afternoon, which lasted the great part of the night, during which the patient was very restless. My diagnosis was pulmonary phthisis at the period of softening. The patient was put under Dr. Churchill's treatment. On the second day after the administration of the hypophosphites, the cough and night sweats had almost entirely ceased, the fever had greatly decreased. On the eighth day the expectoration had lost its purulent character, the patient was able to rest for some time on his left side, which hitherto had been impossible, fever and night sweats had completely disappeared, appetite had returned, digestion was good, pain in the chest had ceased. He was able to sit up for a long time in bed, and looked altogether a different person. On the twelfth day the dulness, on percussion, had disappeared, and the only sound perceived during auscultation was a slight moist crackling. He has slept quietly, and asked to be allowed to get up. On February 4 the patient says he feels quite well, and asks to leave, which he is allowed to do, on condition that he makes his appearance twice a week as an out-patient, so that the case may be kept under observation, and he may be provided with the remedy. This he has now done for several weeks, and his health has so much improved that *the whole system* seems to have undergone *a complete transformation.*'

CASE XXVIII.

(2) A country labourer, aged twenty-nine, after having left the army two years ago, was attacked with intermittent fever, first of a quotidian and afterwards of a tertian type, which lasted a long time. A year ago, after a sudden chill, he was attacked with acute bronchitis, and on the second day threw up a large quantity of blood. Twelve days later, thinking himself recovered, he returned to his work, but three days after that was again attacked with hæmoptysis, since which time he has always suffered from a dry cough, pain in the chest, and loss of breath on the slightest effort. Every ten or twelve days the bleeding recurs, sometimes in quantities exceeding a pound. This was his state when he entered the town hospital, where he was placed under the ordinary treatment for some time, but without any improvement in his condition. On February 1 he was transferred to the Clinique of the Faculty of Medicine, when the following symptoms were noted:—'Considerable pallor and emaciation, hippocratic form of the fingers greatly marked, rest on the left side very difficult, violent cough, increasing during the night, grey solid sputa mixed with blood, quick pulse, pain between the shoulders, fever in the evening followed with night sweats, no appetite and diarrhœa. Dulness at the apex of both lungs, sub-crepitant rhonchus, harsh breathing in the rest of the lung, bronchophony under the left clavicle.' My diagnosis was that of tubercular phthisis in the stage of softening. The patient was ordered to take the hypophosphite of lime. On the third day the diarrhœa had stopped, the appetite had returned, cough easier and less frequent, expectoration less abundant, hectic fever much diminished. On the thirteenth day the cough had become insignificant, expectoration easy, and hardly noticed except in the morning. No sweats, fever or pain in chest. On the fifteenth day, without any apparent cause, the patient was suddenly seized in the afternoon with a feeling of weight and heat in the chest, difficulty of breathing, repeated fits of shivering and violent cough, which were followed by the expulsion of large quantities of red and frothy blood, amounting in the whole to nearly a pound and a half. I was called to see the patient, and in spite of his state of weakness, I ordered him to be bled. This means joined with the use of revulsives and of sulphuric acid,

stopped the bleeding; the hypophosphite of lime was not intermitted. On the twentieth day of treatment by the hypophosphites the patient has been enabled to lie for some time on his left side, which had been impossible hitherto. The cough, fever, night sweats, and other harassing symptoms have entirely disappeared. He has a good appetite, and nutrition seems to be restored. On the twenty-eighth day the patient exposed himself to cold, which brought back the cough, pain in the chest, and the spitting of blood, but which this time only consisted of a few bloody sputa. Dr. Santiago Lopez, professor of pathological medicine, who had taken charge of the patient during my absence for a few days, independently of the hypophosphite, prescribed opiates and astringents with an *emplastrum cicutæ* on the chest. On my return I thought the indications for which these had been used had been sufficiently fulfilled, besides which I was desirous of experimenting the hypophosphites with the utmost possible accuracy. I therefore suppressed all other medicines and continued the specific treatment alone. On the fiftieth day the patient is allowed to take exercise, which he can do without any inconvenience. He has still a little cough, but in the morning only. The dulness has entirely disappeared on the right side, and has decreased on the left, where there is still some moist crepitus. There is none remaining on the right.

Dr. Maestre calls attention to the rapidity with which the specific action of the treatment showed itself: in the first case as early as on the second, and in the second case on the third day. His paper concluded as follows:—'At first sight we might believe these were two cases of cure, but when we consider that we have to do with pulmonary phthisis, we cannot but hesitate, and wait until more prolonged observation has given us more sufficient data. How many modes of treatment among those which are most in repute only owe it to transient improvement, which soon disappears. The only conclusion, therefore, we can draw from the preceding cases is that this treatment, which its author calls a specific cure, greatly relieves the symptoms of this cruel disease, and arrests its progress for a time which cannot yet be indicated. May it in some cases produce a complete cure?' (151–153.)

Dr. Maestre de San Juan will himself provide us with an answer to this question. Three months afterwards (No. 91 of the 'Iberia Medica') he reported the two following cases:—

Case XXIX.

(3) A country labourer, aged twenty-eight, of weak constitution and of irregular habits, living in a damp, low, badly ventilated room, was attacked two years ago by tertian fever, which lasted two months, and only yielded to the use of arsenic. Since then he has had frequent attacks of bronchitis. Last December, after getting wet in a shower, he was seized with chill, pain in the left side, difficulty of breathing, and abundant mucous expectoration, was obliged to take to his bed, and brought up a large qauntity of blood. He took two purgative medicines, and at the end of eighteen days felt better, was able to get up again, but kept his cough and shortness of breath. In January there was a repetition of the hæmoptysis, though less than the first time, after which he was unable to return to his work. In February the hæmoptysis again returned and kept him in bed for a week. He continued in this way with great cough and difficulty of breathing, particularly when attempting to walk, much weakness and loss of flesh, until April 7, when he came to Grenada and entered the hospital. Next day on examination I noted great pallor and emaciation, inability to lie on the left side, dyspnœa, frequent fits of coughing. The expectoration brought up during the night is very abundant, consisting of dirty opaque, fœtid, nummular sputa; pulse 94. Pain between the shoulders, night sweats so abundant that the pillow-cases had to be changed. He complains in the evening of heat in the neck, chest, and palms of the hands; pain in the epigastric region; great thirst; copious diarrhœa; little sleep owing to the cough, appetite good; dulness under both clavicles, particularly under the left; bronchial respiration in the right lung. In the left cavernous gurgling and pectoriloquy both distinctly marked. The diagnosis was phthisis in the third stage.

Encouraged by the *admirable effect* produced in the two preceding cases, I ordered the patient the hypophosphite of lime. The second day there was great decrease of the cough, expectoration, loss of breath and diarrhœa. In twelve days the night sweats disappeared, the cough was much lessened, so that the patient could sleep quietly, expectoration had decreased, and nearly lost its disagreeable smell. Diarrhœa and thirst had ceased, nutrition much improved, and the patient feels very much better. On the fifteenth day, no cough except on awaking, a very slight amount of purulent matter still left in the expectoration. Pain between the shoulders gone, patient able to lie on the left side, hardly any fever at night, appetite good, digestion easy, nutrition restored; patient, hitherto silent and indifferent, has become cheerful and full of life. The seventeenth day, the patient having had to get up during the night, and walk barefooted on a damp pavement, after a considerable fall in the temperature, was taken with a general feeling of discomfort, pain in the sternum and at the top of right lung, great difficulty of breathing, repeated fits of cough, and abundant mucous expectoration. On auscultation, we found a coarse, moist crepitus extending over the whole of the middle region of the right side. The use of the hypophosphite having been continued, and all the symptoms continuing to increase, it was now left off, and the patient was ordered the pectoral decoction of the Spanish Pharmacopœia, with syrup of poppies, extract of opium, and vegetable diet. This was continued for a week, when, the signs of bronchitis having disappeared, he was again ordered the hypophosphite of lime. Three days after he was in the same satisfactory condition as before his attack of accidental bronchitis. On the thirtieth day of treatment the following was found to be the state of the patient:—Little cough, and that in the morning only, able to lie in all postures, sleep sound, neither night sweats nor hectic fever, looks cheerful, appetite and digestion good, is rapidly gaining flesh, and is able to take exercise during a great part of the day without feeling fatigued. On the thirty-fifth day the dose of hypophosphite was increased. The cough immediately got worse, and was attended with difficulty of breathing. The dose was again reduced, the patient returned to the same condition, and remained so till he left the hospital on the 31st of May, in a most satisfactory condition.

CASE XXX.

(4) A weaver, aged seventeen, of lymphatic temperament, weak constitution, born of consumptive parents, living in a damp and badly-ventilated lodging, had bronchitis at the age of thirteen, since when he has been liable to colds, and has almost always had a little cough. He took cold in December last, was seized with pain in the chest, difficulty of breathing, cough, accompanied with mucous expectoration, which kept him in bed for thirteen days. He was then able to get up, but still suffered much trouble from his cough. He was, however, able to return to his work till January in the present year, when, after a violent fit of coughing, he brought up a small quantity of bright, frothy blood. Since then he feels great weakness on attempting to walk, particularly during an ascent, has been obliged to leave off work, and was admitted into my ward on the 17th of January, when the following was noted:—'Great pallor and emaciation, circumscribed red patch on left cheek, inability to lie on that side, great difficulty of breathing, amounting to orthopnœa, frequent and painful cough, accompanied with the expectoration of mucus, among which are found opaque and concrete substances containing miliary tubercles. He complains of pain between the shoulders, night sweats, sleeplessness owing to the cough, fever at night, and extreme weakness; thirst and appetite natural; extensive dullness on percussion under both clavicles; prolonged expiration and bronchophony at the apex of both lungs; under the right clavicle well-marked sub-crepitant rhonchus. The diagnosis was the second stage of pulmonary phthisis. The patient was ordered the hypophosphite of lime, and *so admirable were the effects* of this remedy, that on the second day the dyspnœa disappeared, the cough had greatly decreased, and the patient was able to lie down during sleep, which he had hitherto been unable to do. On the fifth day the breathing had become rather more frequent, though still easy, the patient was able to draw his breath freely without bringing on the cough, which now only occurred in the morning. The expectoration contained nothing but mucus, and the night sweats had ceased. The thirteenth day of treatment the dose of the

remedy was increased: the same night the cough became worse, and the patient threw up with the expectoration three masses of tubercle of the size of a hazel nut, and seven smaller ones. My colleague, Dr. G. Duarte, professor of general and anatomical pathology, who was then lecturing on the subject of these morbid productions, made use of them for the demonstrations during his lectures. Next day the breathing was much freer, the dullness under the left clavicle had decreased, and vesicular murmur was beginning to return. The patient was able to sleep quietly in all postures, was rapidly gaining flesh, and asked leave to go out. On the eighteenth day there was hardly any cough, only a little mucous expectoration, appetite good, and nutrition much improved. On the twenty-third day there was a great fall in the temperature. The patient, having gone out, was attacked with severe bronchitis, the symptoms of which seemed to get worse under the use of the hypophosphites. They were therefore left off, and he was ordered pectoral remedies and opiates. By these means the bronchitis yielded at the end of thirteen days, and the patient then returned to the use of the hypophosphite. The increase of cough, which had remained after his bronchitis, disappeared on the second day after the return to the specific treatment, and the patient was then found to be in the same condition as before this last attack. On the forty-fifth day, the dose of the hypophosphite was increased, breathing became difficult, and cough was aggravated, which induced me to revert to the former dose, which the patient continued to take till the 4th of June, when he left the hospital in a most satisfactory condition.

518 A. Dr. Maestre ends his paper with the following conclusions :—

'1. The hypophosphite of soda or lime *must be perfectly pure.* This is one of the causes of the advantageous results I have obtained (87—93).

'2. The hypophosphites must be given when tuberculosis is, so to speak, in an isolated state. When it is complicated with an accidental inflammatory state of the respiratory apparatus, this treatment, as we have seen, aggravates the condition of the patient. In such cases it must be immediately omitted, *and again resumed as soon as the complication has disappeared* (163, 195).

'3. In the treatment of pulmonary phthisis the hypophosphites should be given alone, and without any other pharmaceutical preparation, *otherwise their action will be impaired or prevented* (205).

'4. The dose of hypophosphites must not exceed a certain limit, beyond which they are likely to produce unfavourable results (193).

'The alkaline hypophosphites are the best preparations hitherto known for the treatment of tubercular phthisis.'

I only wish to add two remarks upon Dr. Maestre de San Juan's remarkable papers. The first is that the clinical particulars with regard to the conditions of action of the hypophosphites, which he has so ably noted, were arrived at by his own independent observation, as at the time they were made my first French work on the subject of the hypophosphites was not published, and he was only acquainted with them through the abstract of my paper published in the Memoirs of the Academy of Medicine, which contained no details whatever as to the treatment.

The agreement between the results he has arrived at, and my own, of which the details have already been given, is therefore of very great value.

The second is that some years ago, long after the publication of his papers, I had the pleasure of corresponding with Dr. Maestre, and he informed me that further experience in the use of the hypophosphites had made no change in his views of their action, or in the conclusions which he had arrived at, and which he had already published.

519. Dr. Parigot, Professor in the University of Brussels, and physician to the Orphanage there, published the following cases in the 'Journal de Médecine de Bruxelles,' vol. xxvi., April, 1858 :—

Dr. Parigot prefaces his observations with the following remarks. After referring to a paper published by Drs. Vigla and Trousseau, of Paris, in which these physicians said, that among the patients treated by them with the hypophosphites there had been no improvement, even in a single symptom, Dr. Parigot goes on to say, 'After having tried the hypophosphites myself, I protest against the exaggeration of this conclusion. How is it possible, in the present state of organic chemistry, to admit that the introduction of phosphorus into the system, even in large doses, can be followed by no effect? I wish to give an account of several cases from my private practice, and from the sick ward of the Orphanage at Brussels, which is under my charge.

'Need I say that, after twenty-five years' practice, I am not likely to be very sanguine about the success of remedies, which are said to produce miraculous cures? *We have all been so often subject to disappointment in cases of this kind, that we are rather apt to err on the side of scepticism than otherwise.* After having read Dr. Churchill's work on phthisis, I therefore decided to try his mode of treatment, as a matter of duty incumbent on my position as medical head of the hospital. It is a well-known fact, as ascertained by my predecessors, that most of the children at the Orphanage are the issue of parents who have died of consumption. They bring the seeds of the disease with them, and the annual mortality from this complaint is very great. This fact made it specially incumbent upon me to try the new mode of treatment, the more so as I was also able to act in the incipient stages of the disease (188).

'It is probable that Messieurs Vigla and Trousseau have been unsuccessful, because their treatment was only applied to those poor wretches in the last stage of the complaint who encumber the wards of our hospitals, and whom the physician too often passes by without even looking at them. In the following cases I must say t *I have only been completely successful when I was cer that the remedy was perfectly pure.* It is a very markable fact that, in my first experiments, the hypopl phite of lime obtained from different chemists was equ good, and equally active in all cases. There was t but little demand for it, but since this demand has creased it has been less carefully prepared, and has alre become subject to adulteration, as pointed out in journal by Messieurs Heywaerts and Francqui (87— When the effects of the treatment have been once e blished, and the improvement of the patient has bec well marked, I have often left off the use of the hy phosphite of lime for a few days, and have tried o modes of treatment, such as antimonials, opium, cod-l oil, either alone or alternating with the hypophospl but I have always been compelled to revert to the spe treatment, and have found the patients the better for so doing. I will now only give you a few cases in order in which they came under my notice. *So far treatment has not failed me in a single case.* Tw three of these are still under observation, and might shown in proof of the reality of the results I h obtained.'

CASE XXXI.

(1) A woman aged thirty, cook in a hotel, of lymph temperament, has had a cough for several years. She has flesh, as well as her appetite, and also her voice; menstrua irregular; leucorrhœa producing great weakness; ausculta shows deficient respiratory murmur in the right lung. has had ergotine prescribed to her, and the uterine compl has been benefited, but the cough and other symptoms conti I ordered the hypophosphite of lime. After about a fortnight patient returned to see me, and thanked me. She is in g health, only her voice has remained somewhat weak; all functions are normal; there is seldom any cough, and the

mal respiratory murmur is now heard in the portion of lung originally involved.

Case XXXII.

(2) I was consulted by a gentleman from Paris, whose mother and one sister had both died of phthisis. The patient is pale, but one cheek is a bright red. He is much depressed, and thinks himself consumptive. He is of an excitable temperament, and follows a profession which requires that his imagination shall be constantly active. He complains of cough at night, loss of appetite, want of sleep, and of perspiring with the least effort. The pulse is small and quick. He is pigeon-breasted, with great depression under the clavicles. He spits up streaks of blood. I prescribed the hypophosphite of lime; a few days after he called again, stated that he coughed less, slept well, perspirations have decreased and appetite has returned. As he intends leaving for Paris, he wishes to take a prescription with him, and continue the treatment. I was much struck with the fact that the pulse is less frequent, and that the redness of the left cheek has disappeared; but I have not heard from him since.

Case XXXIII.

(3) Madame La Baronne D. has been coughing for six months, has lost flesh very much; her strength has much decreased, and she perspires at night; appetite altogether gone. Pulse small and rather frequent; has become very nervous and irritable since the beginning of her complaint. Percussion and auscultation give no positive sign of disease; has taken no drug, but her country doctor has given her decoctions of barley and soothing potions. I ordered the hypophosphite of lime, and on the second day there was an improvement. Four days after the most important symptoms had decreased or had disappeared. After a fortnight's treatment this lady was restored to perfect health. She was kept under the treatment for some time longer, and the improvement has been so great that it would seem impossible she could ever have been so seriously ill.

Case XXXIV.

(4) An orphan girl of eighteen whose sister died of consump-

tion; had hitherto enjoyed good health, though evidently
tubercular diathesis, until last October, when she was sud
taken with spitting of blood. Since then she complains of
in the back, cough, night sweats, loss of sleep, and total l
appetite. She is in very low spirits on this account, and
her companions she does not expect to live long. The ch
well proportioned, but there is dulness on the right side,
before and behind; no respiratory murmur perceptible on
side; sub-crepitant rhonchus on the left. The treatmen
first prescribed was the hypophosphite of lime alone, an
improvement was so rapid that all who knew her were st
with surprise. *Among them were several persons accust
to the fatal progress of this disease, and no one expected
she had more than a few months to live.* All the symp
disappeared as by *magic*; but her constitution, whic
evidently highly tubercular, will make the danger of a re
much greater. This girl is an example of the carelessne
characteristic of persons affected with tuberculosis. We
been obliged to compel her, so to speak, by force to follow
treatment, and the authority of the matron of the estab
ment has been constantly required to oblige her to atten
consultations. The past winter has been very unfavourab
this class of diseases, and she has frequently caught c
and it is only quite lately that she has followed my pres
tion with any degree of regularity. There have been se
returns of the cough, which has yielded on each occasion to
use of the hypophosphite of lime. Although her constitu
and the nature of her symptoms were such as left no room
hope, at present she is in a state of health which, if not
gether perfect, is at least such that we may hope to se
entirely restored. Yesterday (March 17) we found on auscu
tion that respiration was not yet altogether normal, but
disease is arrested, and all the most alarming symptoms
disappeared, which is a great deal.

CASE XXXV.

(5) An orphan girl of seventeen, of consumptive par
and whose sister died a few months ago of the same disease,
taken at the beginning of the winter with dry and haras
cough. On examination I found increase of the respira

murmur, and the least exertion produced such shortness of breathing that she was unable to speak. The other functions are normal, but she complains of night sweats and want of sleep. There was also increased frequency of the pulse. The prognosis as drawn from preceding cases in the orphanage could leave no doubt that she would go the same way as her sister. She was ordered the hypophosphite, and all the symptoms of the disease immediately disappeared. A few days ago, on auscultation, respiration was found to be natural.

CASE XXXVI.

(6) A young lady having suffered from intermittent fever in America had fallen into a great state of weakness, consequent upon violent medical treatment and a long sea voyage. When she first consulted me I found her pale and emaciated with weak pulse and frequent suffering from leucorrhœa and great impoverishment of the blood, considerable erethism, and hectic fever. She was ordered tonics and astringents, under which her general condition seemed to improve; but her chest then became affected. She was taken with dry cough, want of sleep, and night sweats, complains of weight upon the chest; emaciation has made further progress, and her condition has become so much aggravated that her family give her up as lost. Although the severity of the winter has been such as greatly to aggravate all inflammatory conditions of the chest, the use of the hypophosphite of lime has given great relief, and all the most alarming symptoms have disappeared. The patient is only waiting for the return of fine weather to resume exercise in the open air, of which she has been deprived. I have occasionally intermitted the use of the hypophosphite, but every resumption of the specific treatment has been followed by new improvement.

CASE XXXVII.

(7) A lady of forty had several epileptiform attacks last summer, during which there was great congestion of the head and chest. These have been followed by great weakness, accompanied with profuse perspiration on the least exertion. About three months ago she took cold after a walk, and since then has complained of cough, accompanied with dark and

fœtid sputa. The odour is so repulsive as to excite the repugnance of all who wait upon her. The patient is very much alarmed, and her family look upon her as lost. There is dulness on percussion in the upper half of the left lung, with moist crepitus in front and in the sub-scapular region of the same side, but no signs of a cavity. The patient complains of the treatment she has been subjected to, consisting chiefly of purgatives. She has no appetite, and the bowels are very irregular. Under the use of the hypophosphite of lime the digestive function was restored, the other symptoms have gradually diminished, the expectoration lost its smell and taste, and has now altogether ceased. This lady is now in full convalescence.

CASE XXXVIII.

(8) A short time since I was called in consultation for an old gentleman of seventy, who had had an attack of apoplexy, consequent upon excess of different kinds. Dr. Pousset and myself after prescribing drastic purgatives, which produced a very good effect, finding the patient remained in a complete state of prostration, with inertia of the nervous and locomotor systems, thinking it would be dangerous to have recourse to diffusable tonics or stimulants, decided we would try the hypophosphite of lime in progressive doses. In a few days' time our patient was on his legs, and since then we have had no reason to fear any fresh congestion of the nervous centres.

519 A. 'Such,' adds Dr. Parigot, 'is a brief summary of some of the cases I have observed in my practice. I hope they will induce my medical brethren to try the hypophosphites of lime and soda in cases where it is still possible to expect some benefit from their action on the system. My conclusion is that, in spite of Messieurs Trousseau and Vigla, *unhoped-for* results may be obtained by Dr. Churchill's mode of treatment.'

520. Dr. Reinvillier, of Paris, in a review of the first edition of my work on 'Phthisis,' made the following statement ('Courrier de Paris,' April 22, 1858) :—'The facts published by Dr. Churchill have excited the attention of a

number of physicians *in spite of the general feeling of discouragement produced by the failure of all treatments hitherto tried against phthisis.* Many of them, however, seem not to have obtained results agreeing with Dr. Churchill's. Although unwilling to speak of myself, I think I am only fulfilling a duty in bringing forward my little stone as a contribution to the erection of this new scientific edifice. *The question is of so much interest to mankind at large that it is the duty of every one to say what he knows and what he has seen with regard to this new treatment of phthisis* (492).

'In presence of the *admitted inefficacy of all former modes* of treatment, I wished to make my experiments according to the rules laid down by Dr. Churchill, and to my great joy, almost against my own expectation, I succeeded in my first two attempts.'

CASES XXXIX. AND XL.

(1, 2) Both these patients were consumptive, and in the third stage of the complaint; one was a man of thirty, originally of a good constitution, but which had been broken down by irregular living. The other was a young lady of nineteen, in the last stage of consumption, according to the opinion of several physicians of high standing, and who seemed to have but a short time to live. At this period of life this disease is particularly fatal. The hypophosphite of soda was taken for four months, at the end of which time the cough, purulent expectoration, night sweats, emaciation, and extreme weakness had altogether disappeared, the whole system was restored, and the patient had regained the look of perfect health.

'I know that two isolated cases,' says Dr. Reinvillier, 'do not afford conclusive proof, still if we reflect that *examples of recovery in this stage of the disease are so uncommon that men who have grown gray in the profession have never witnessed a single case* (155), it must be confessed that though I only bring forward two cases they cannot be said to be without value. Either the new mode of treatment discovered by Dr. Churchill is one of great hope, or I must have been singularly favoured by chance. However that may be, I have undertaken a new series of researches on the subject. The question naturally occurs, whether no explanation can be given of the alleged failures. Has every practitioner followed the rules laid down by Dr. Churchill? (199). May not scepticism as to the value of the remedy have led to too active or irregular treatment? (191—194). Again, was the drug always well prepared? I lately asked the head of the medical staff of a large provincial hospital, whether he had obtained any favourable result from the use of the alkaline hypophosphites. On his answering in the negative, I then asked whether he was sure of the purity of the medicine he had used. "*Of course not,*" was his reply. Now, it would be no wonder that a chemical product hitherto without use, requiring a certain degree of skill for its preparation, and which has suddenly come to be in great request, should not be found in every chemist's shop in a perfectly pure state' (87—93).

In another article, published six months later, in the same paper ('Courrier de Paris,' September 9, 1858), Dr. Reinvillier wrote as follows:—'Some months ago I mentioned the success I had obtained in the treatment of consumption by means of the alkaline hypophosphites, and stated that I had undertaken a series of experiments upon a large scale and would make known the results. I am now able to redeem that promise. I have collected a large number of observations, *some of cases treated by myself, the rest from the practice of other physicians, and I may state that the phosphorized treatment has been found useful in almost every instance. Not only have consumptives been cured in the first period of the disease, but also a large number of those who have gone through all the stages of this terrible malady.* Are we thence to conclude that we shall be able to cure every case? Of course not (235). But what may, even now, be asserted is that recovery is very often possible. This may, no doubt, appear an audacious assertion to those who have not been eye-witnesses of the facts, or who have pinned their faith to the denials of physicians who have been unsuccessful in the use of the hypophosphites. *However, they will have to yield to evidence, and recognize that amidst the great scientific movements of our time the science of therapeutics has progressed like the rest, and has at last realised a grand conquest.*'

521. Dr. Galvez, of Havannah, and Dr. Jules Leriverend, Clinical Professor in the Faculty of Medicine of that city, published the following report in the June number, 1858, of the 'Revista Medica de la Isla de Cuba': —'We cannot say that the results we have obtained have always been favourable, but the result has sometimes been so advantageous that we do not hesitate to say that we look upon the hypophosphite of lime as the best means hitherto known for combating tuberculosis in *all cases where the disorganization of the lungs has not reached the point of seriously interfering with their functions*, either by the formation of cavities or the destruction of a large number of lung cells' (235).

CASE XLI.

(1) Among the cases which have come under our treatment we may specially mention that of a young man of eighteen, of lymphatic temperament, weak and delicate constitution, and belonging to a family, several members of which died of consumption. He complains of being subject to colds, constant cough in the morning without expectoration, and of wandering pains in the chest. There is no change of sound on percussion, but auscultation shows fine crepitus at the apex of both lungs, with a few coarse rhonchi disseminated throughout the rest of their extent. These signs joined to the commemorative symptoms made us diagnosticate a case of tubercular phthisis, and he

was ordered the hypophosphite. The treatment lasted forty days, at the end of which all the pathological phenomena we have mentioned had disappeared. The patient's appetite has greatly increased, he has gained seven pounds in weight, and at the present moment, four months after the treatment, is in the enjoyment of perfect health, while his *organic development has remarkably improved* (126, 127). The hypophosphite was the only remedy used.

CASES XLII. AND XLIII.

(2) Since then we have prescribed the hypophosphite in two similar cases, and with exactly the same results, except that the curative effects have not been so rapid, that the treatment lasted a longer time, and that larger doses were required.

CASE XLIV.

(3) A little girl of two years of age, suffering from mesenteric tubercles, whose father was tubercular, and who showed all the signs of an advanced stage of this complaint, experienced from the very first use of the hypophosphite of lime an increase of appetite, which up to that time had been altogether wanting. The hectic fever daily diminished in intensity and in length. Diarrhœa became less frequent, and the stools more natural. Night sweats had entirely disappeared; and both ourselves and her parents had full hopes of her recovery, when the child was attacked with carbuncle in the left cheek and died in three days.

'Among patients who had cavities the results have varied in different cases. *When the excavation was small, the general symptoms have rapidly decreased, and in some have altogether disappeared.* In all cases there has been an improvement of the digestive functions, and sleeplessness has ceased. In most cases also, the same effect has been produced upon the fever and night sweats. Only in a small number of cases in the third stage have we observed a marked improvement in the local auscultatory and percussion signs (155). In cases where there were large and numerous cavities we have often seen the administration of a large dose of hypophosphite followed by an attack of difficulty of breathing, and in such cases, if the treatment was not immediately suspended, this was followed by hæmorrhage (202). In this way one patient was carried off in less than 24 hours. We have observed that when the softening of the tubercular matter was not far advanced the patient could bear much larger doses of the remedy than when suppuration was fully established or when cavities were already formed (199, 200). In cases of irregular menstruation it has become normal, but when once suppressed we have not seen it restored (149). As the result of our observations, we find that the hypophosphite of lime cures consumption in the first stage, and arrests the disease in the later stages. The immediate effect of the remedy is an increase of appetite, improved digestion, suppression of hectic fever and of colliquative sweats whether partial or general. These effects have been observed in a large majority of our patients. In all advanced cases the remedy should be used with caution' (199, 200).

522. Dr. Campbell in the 'New York Medical Press,' January 14, 1860, thus relates his own case:—

CASE XLV.

I had lost flesh continuously, owing to softening tubercles in the upper lobe of the right lung. I had been for some time under *tonic treatment*, without any appreciable effect except slight increase of appetite. Shortly after having begun the use of the hypophosphites I found that my strength had greatly increased. I slept well at night, and was no longer worried by perspiration. The only ill effect I experienced was bleeding at the nose, and hæmorrhoidal discharge, from which I had suffered a year before. Five weeks ago, when I began the use of the remedy, I only weighed 147 lbs. I now weigh 161 lbs., rather more than my usual weight when in health. My appetite and sleep are now good, and I feel quite able to live in spite of the formation of a cavity, which is now taking place in the upper part of my right lung (156—160). The improvement in my general condition is most remarkable, and that is what encourages me to speak thus. Everybody agrees in saying that I never looked so well as I do now.'

523. Dr. R. C. Heslop, of Preston, published the following report in the 'Medical Circular,' March 14, 1860 :—

CASE XLVI.

(1) In October last I gave a young man, aged twenty, five grains of hypophosphite three times a day. He had all the symptoms of phthisis; had diarrhœa; was drenched with morning perspiration; and had no appetite, and his loss of flesh and strength was so rapid that it threatened to be a case of galloping consumption—there was unmistakeable evidence of crude tubercle in the lungs. When he had taken the hypophosphites a month his appetite became voracious; he gained weight at the rate of three pounds a week for three successive weeks, and felt so strong and well that he resumed his work as a factory operative, and has continued at it until the present time. I saw him again last Saturday (Feb. 25), he is now losing flesh, and has a dry cough, with partial aphonia, no night sweats. I advised him to rest and resume the hypophosphites (198, 225), with what results time will show. No other remedial agent was used in this case except nutritious diet.

CASE XLVII.

(2) A sister, aged twenty-five, of the last patient, has persevered with the hypophosphites for twelve months. She has had chronic phthisis for five years, it had been kept in abeyance by cod-liver oil until twelve months ago, when from some unexplained cause her digestive organs would not tolerate it any longer, when she rapidly declined in health. I then gave the hypophosphites. The improvement was more marked and permanent than in her brother's case. I saw her again on Feb. 25, when she expressed herself as being quite well—never better in her life. She had a robust appearance, and was very stout. All the general symptoms have disappeared. I had not an opportunity of examining the chest.

'So far from no effect being produced by the hypophosphites (as stated by Drs. Quain and Cotton), I am in the habit of prescribing them in any exhausted condition of the system, where loss of appetite and debility are the most prominent symptoms.'

'The following case briefly illustrates their utility in a case of strumous dyspepsia, attended with debility':—

CASE XLVIII.

(3) On June 14, 1859, a patient began the treatment with the hypophosphites. His weight was 6 score 17 lbs., his appetite poor and weak. June 20, 7 score 1 lb. Aug. 13, 7 score 5 lbs., his appetite and strength keeping pace with his increasing weight.

CASE XLVIII A.

On Jan. 14, 1860, I gave the hypophosphites to a farmer, aged forty-three, who had taken various tonics for a month with no improvement to his appetite and strength. On making an examination of his chest I found evidence of a slight deposit in the upper part of the left lung. He had gradually lost flesh, and had been troubled with dyspeptic symptoms for six months. On the administration of the hypophosphites his appetite gradually returned, and he began to gain weight, having gained four pounds in a fortnight.

524. Dr. Denobele, Physician to the Prison in Ghent, Belgium, tried the hypophosphites upon 16 prisoners, and published the following account of the results obtained ('Extrait des Rapports Semestriels'—'Archives belges de Médecine militaire,' t. xxiv. 1859):—

'I have devoted,' says he, 'particular attention to the study of phthisis, and seeing that the usual treatment produced no satisfactory result, I cast about for the means of doing something better. I had read Dr. Churchill's paper on the use of the alkaline hypophosphites. The numerous cures obtained by him, the researches of other practitioners published in the medical journals, and several observations published by Belgian physicians, gave me confidence to experiment this treatment. I began the use of the hypophosphite of lime on August 26, 1858, and continued it up to December 3, in the same year. Sixteen patients suffering from confirmed phthisis in the second or *third* stage were put under the treatment. They were suffering from the usual symptoms of emaciation, cough, either dry or accompanied with muco-purulent expectoration; night sweats, dulness on percussion, crepitus, cavernous rhonchus, etc. I did not note any unfavourable action due to the hypophosphite of lime. The first effects I observed were produced upon the nervous system. *The patients became stronger, cheerful, and more active. In a few days' time the sanguineous system seemed to improve, the face assumed a better colour, animal heat somewhat increased, the pulse stronger and somewhat more frequent. The night sweats diminished in several cases, in others entirely ceased, and in others again underwent no alteration. In most the expectoration was very much improved.* During the first day's use the medicine seemed to disagree with the stomach, but this symptom disappeared on dissolving the salt in a larger quantity of distilled water. *The digestive functions, which were languid in most of these patients, improved in almost all, and nutrition was carried on much more powerfully than before.* This was proved by taking the patients' weight from time to time, as shown in the following table:—

Names	Weight at commencement.	Weight at subsequent period	Weight at end of treatment	Remarks
	kil.	kil.	kil.	
Barrat . . .	66	63½	62½	Re-entered the Infirmary Dec. 19, weighing only 59 kil.
Von Maldeghem .	63		65	
Jagard . .	67		68	
Meyer . .	71	71½	73	Two years ago, on entering the prison, he weighed 84 kil.
Herwegh . .	58	57	58	
Nyshens . .	70	69	72	
De Sodt . .	52½		54	
Von Cauwenberg .	55	56½	60	
De Blaère . .	62½		65	
Tummermans .	60½		63	
Dehertogh . .	70½	72½	73½	
Do. on his return to the Infirmary	72	73	74	On Dec. 20, sixteen days after having left off the treatment, his weight had fallen to 73 kil.
Dupère . .	63	65½	66½	

The following table shows the times at which the treatment was begun, suspended, or left off, and the result as noted on the last day of treatment:—

Name.	Date when treatment was begun.	Date when treatment ceased	Result of Treatment.
Barrat	Aug. 26	Sept. 29	Left sick ward in pretty good case.
Vandereyden	Sept. 15	Sept. 22	Treatment left off at the end of a week on account of a series of inflammatory complications in the pelvis.
Von Maldeghem	Aug. 28	Sept. 7	Left pretty well.
Jagard	Aug. 26	Sept. 3	Pretty well.
Meyer	Aug. 26	Dec. 3	Pretty well. Hoarse voice.
Herwegh	Nov. 3	Dec. 3	Pretty well.
De Meyer	Aug. 26	Oct. 12	Left off treatment on account of diarrhœa and lumber abscess, of which he died.
Nyshens	Aug. 26	Oct. 12	Pretty well, but has lost his voice.
De Sodt	Sept. 1	Sept. 20	Treatment left off on account of hæmopytsis.
Von Cauwenberg	Sept. 6	Dec. 3	Hardly any cough or expectoration left.
Melin	Aug. 26	Oct. 6	No result. Treatment left off on account of diarrhœa.
De Blaère	Sept. 4	Oct. 20	Leaves; returns on Oct. 30; takes the remedy to Dec. 3; leaves well, but has to return nine days afterwards.
Tummermans	Nov. 20	Dec. 3	Well.
Dehertogh	Aug. 26	Dec. 3	Manifest improvement.
Dupère	Aug. 26	Dec. 3	Most significant improvement.
Cuyvers	Oct. 30	Nov. 13	Well.

'On December 3, *my stock of hypophosphites being exhausted, I was compelled to leave off the treatment.*'

525. Drs. Feldman and Pfeiffer, Physicians to the Dispensary of the German Charitable Association, in Paris, published the following observations in their report for the

two years from July 1, 1858, to July 1, 1868 ('Dispensaire de la Société allemande de Bienfaisance'—'Compte Rendu' du 1er Juillet, 1858, au 1er Juillet, 1860, Paris, 1860, p. 28, 29 et 30):—

'It is now,' say they, 'an established fact that by carefully managing the use of the hypophosphites *most surprising results may sometimes be obtained.* In our own practice we have arrived at this result, because we have acted as if phthisis might be curable even in its constitutional form. We have not abandoned *even the most advanced cases*, and have thus been able to prolong the life of many unfortunate patients, and *have enabled men who appeared to be at death's door to return to their work.* The following are instances:—

CASE XLIX.

(1) A man of forty-eight years of age, with cavities in both lungs, and inflammation of the sheaths of the tendons of the left forearm and the right leg, was kept up for a very long time by means of cod-liver oil and the hypophosphite of lime, and after each period of manifest improvement was able to return to his laborious occupation of pulling down houses.

CASE L.

(2) A tinker, of thirty-one years of age, has been under our treatment for more than four years, and without suspending his work, is gradually recovering from tuberculization of the upper part of the right lung, with which he was first attacked. He has been taking the hypophosphite of lime.

CASE LI.

(3) A woman of thirty-three, attends our consultations from time to time with symptoms of bronchitis of a suspicious character, from the fact that her sister died of consumption. In her case there can be no doubt as to the value of the hypophosphite of lime.

526. In the 'Lancet,' September 5, 1863, Dr. Vintras, Physician to the French Hospital in London, published the following article:—

'I have read in "The Lancet" of April 25 and May 2 a report by Dr. Cotton of twelve cases of phthisis treated by the hypophosphites of soda and lime. As I have myself made some experiments with this new mode of treatment, the results of which rather differ from those of Dr. Cotton, I think it only fair to Dr. Churchill and the profession to publish a few cases in which the hypophosphites appear to have done good, so that this new remedy may not be thrown aside hastily without further trial. I may state here that I do not know Dr. Churchill, nor have I ever corresponded with him, but was induced to try the drug in consequence of reading the successful results published by him in the medical journals. I have selected four cases, *not because they are the only satisfactory ones*, but because *they are to me conclusive.*

CASE LII.

(1) 'M. P., aged twelve, was brought to me on July 2, 1862. Had been suffering from what the mother called a "bad cold" for two months. Had been in a school at Richmond, and received medical attendance there. Not getting better, she was sent back to her parents. There was increased cough; much expectoration, had lost her appetite, and become very thin; perspired at night.

'Examination detected dulness on percussion under the right clavicle for a large space with gurgling rhonchus; on the left side respiration short, but healthy. Cough mixture and tonics were ordered, but no improvement took place.

'*July* 10.—Has brought up a great quantity of most offensive matter with immediate relief.

'13.—Has coughed up a little blood.

'18.—Has slightly improved, but night perspirations continue. Ordered the citrate of iron and quinine, which she took for a fortnight without apparent benefit.

'*August* 2.—Has again vomited a quantity of purulent matter, had been feverish for a day or two. Now commenced the use of the hypophosphite of soda, one grain twice a day and a teaspoonful of cough mixture night and morning.

'10.—Has improved a little, appetite beginning to return. Discontinued the cough mixture, and increased the dose of the hypophosphite to three grains daily.

'20.—A little dry cough at times; hardly any expectoration; appetite good; night perspirations ceased.

'*September* 11.—Has again brought up some purulent matter, much less in quantity, though still offensive. The attack came on quite suddenly, without any previous constitutional disturbance.

'I persevered with the hypophosphites until February, when the child had become quite fat and healthy looking. Her cough having ceased, I therefore discontinued all treatment. I have seen her several times since, and her health appears very good.

'In this case a continued improvement followed the use of the hypophosphites.

CASE LIII.

(2) 'Mrs. D., aged thirty-eight, consulted me in Dec. 1862. She had had four children, nursed the last for thirteen months, was obliged to wean it last October on account of her bad health. Three months previously she had hæmoptysis for a week; since October the cough had been incessant, the spitting abundant, she perspired at night and had no sleep, catamenia absent.

'Dulness on percussion under the right clavicle, with pain there at times; large crepitant rhonchi. Respiration feeble, but natural, on the left side.

'Began the treatment with the hypophosphite of soda on the 21st of December. She took four grains a day, and a tablespoonful of cough mixture every four hours.

'A week afterwards her appetite had slightly improved, the tongue was cleaner, the cough had diminished and she could sleep a little at night. Ordered to continue the hypophosphite of soda, the cough mixture to be taken night and morning only.

'*January* 6, 1863.—Much better; the cough had diminished; the expectoration was easy, and less in quantity, the appetite had returned. She had not touched any meat for months, and now she could eat it readily.

'At the end of January I saw her again; the improvement continued; she was much stronger; appetite good; tongue clean; she only coughed in the morning; had ceased for some time to take the cough mixture; was going on with the hypophosphite.

'In February she called to tell me she was quite well; had no cough at all; slept well; catamenia had returned.

'In this case it seems to me that the beneficial action of the hypophosphite is quite evident, as no other medicine was exhibited; and during the whole time she remained under treatment she was following the laborious occupation of school-mistress.

CASE LIV.

(3) 'F. C., aged twenty-nine, brass founder; first seen November 29, 1862; died March 15, 1863. Had been ill for five months. Began by spitting a large quantity of blood; night perspiration; troublesome cough; expectoration copious; tongue clean; appetite good; great thirst. Had been confined in bed three weeks when I first visited him. He was living in great poverty, and unable to provide himself with necessary food. A medical friend, who saw him with me, did not think he could live a fortnight, and administered the hypophosphites, with a view of watching their action in this extreme case. There was great emaciation, flattening of the chest, and a large cavity at the apex of each lung. He was ordered one grain of hypophosphite of soda three times a day, and a cough mixture every four hours. Three days after his first taking the medicine, he told me that if he continued to improve daily as much as he had already done he should be able to resume his occupation in a week. Two grains of the hypophosphite were now ordered thrice a day, and one grain of quinine before meals twice a day. The improvement continued for a month; he could sit up for several hours in the day; and walked about the room. But he went out without my permission to see a friend, and overtired himself, took to his bed, and never left it, though he lived for two months.

'In the above case I think the immediate effect of the phosphide salt is undeniable, and verifies the statement of Dr. Churchill, that "from the very first day there is frequently observed a remarkable increase of nervous power" (118, 185). Although the *specific* action of the drug may be questioned, yet it must have exercised some powerful influence in stimulating the vital energies of this patient under very adverse circumstances (229—235).

CASE LV.

(4) 'Mrs. T., aged twenty-eight, married, without children, applied to me November 18, 1862. She had suffered from a cough for nearly two years; had had hæmoptysis several times; night perspirations; no sleep; no appetite; had lost flesh, and become very thin and weak. She had great pain between the shoulders, and had been told by her last medical attendant that she was consumptive.

'On examining her chest, there was dullness on percussion under both clavicles, the extent of which was larger on the right side than on the left; the respiration was short and hurried, with sub-crepitant rhonchus; she could not take a deep breath. On the left side the breathing was short and harsh, with prolonged expiration. Ordered one grain of the hypophosphite of soda thrice daily, and a cough mixture to allay the irritation of the cough and procure sleep.

'*November* 28.—Cough less troublesome. She was in better spirits, but still complained of night perspirations and want of sleep; had no appetite for meat. No change in the medicines.

'*December* 8.—There was some improvement; the cough and expectoration had greatly diminished; she could sleep at night, and only perspired a little towards morning. One grain of quinine twice a day was added to the above treatment.

'*January* 6, 1863.—Had been to a ball, and fancied she had caught cold; cough much increased; pains in the chest and between the shoulders. Had not taken the medicine very regularly of late. Same treatment without the quinine.

'14*th*.—Better; regaining strength and appetite. To continue the phosphide salt as before, with one grain of quinine twice a day; cough mixture at night only.

'I saw her every week until the 11th of March. The improvement was gradual and steady; she had discontinued the quinine for some time, but had persevered with the hypophosphites; had no cough, no perspiration at night; the catamenia regular.

'I called upon her in May; she had no unfavourable symptoms, and expressed herself as being quite well.

'In this case the patient had been ill for nearly two years, and under the care of several medical men. She hed taken all sorts of medicines without any benefit. The disease was progressing, in spite of treatment, until she took the hypophosphites. After using this remedy for four months she felt so much better that she considered herself well. Whether this reappearance of health will last or not is a most important question; but there must be something in a drug which has produced such results.'

Dr. Cotton having pretended that in his own cases when the patients had shown any improvement it was not due to the hypophosphites, but to the other drugs given at the same time. Dr. Vintras says:—

'I shall abstain from making any further remarks on the above cases, and leave them to speak for themselves. But I must say that I fail to see with Dr. Cotton, why steel or quinine, or any other medicine, should not be given at the same time as the hypophosphites. The drug appears to me to stimulate the "nervous power," and certainly a tonic treatment in combination with it is not there contra-indicated, nor can it tend to depreciate the remedial action of the salt. Dr. Churchill's own statement is, that the hypophosphites are "a *specific* remedy for the tubercular diathesis, and prevent any new tubercular deposits." Assuming this to be the case, it is no reason why the existing lesions, or the many complications of phthisis, should not be treated by the appropriate remedies (215 B). One might almost as well say that a simple cough mixture or wine given during the said "specific treatment" renders its ultimate success inconclusive.

'Without claiming a *specific action* for the hypophosphites (229—235), I have, however, prescribed them at the French dispensary with very satisfactory results.'

527. The following brief notes of three cases are given by Dr. Bougard in the report on my discovery read February 6, 1865, to the Royal Medical Society of Brussels, to which reference has already been made (184):—

CASE LVI.

(1) A young lady of eighteen years of age, with a tubercular deposit in the crude state, who complained of dry and frequent cough, uninfluenced by all the ordinary modes of treatment, loss of flesh, difficulty of breathing, with obscure respiratory murmurs at the top of both lungs, after employing different modes of treatment without any success, was given the hypophosphite of soda. This was followed by rapid improvement, and the cure has now been permanent for two years.

CASE LVII.

(2) A young student of seventeen years of age, in nearly the same conditions as the preceding patient, but with violent cough, streaks of blood in the expectorated mucus, frequent bleedings at the nose, high-coloured cheek-bones, very great want of breath, was given the hypophosphite of soda. This was followed by rapid improvement, and a cure at the end of three months. It has now been permanent for one year.

CASE LVIII.

(3) A youth of fifteen, with evident symptoms of laryngeal phthisis, which had resisted the most powerful modes of treatment, was ordered the hypophosphite of soda. He is now in the way of full recovery.

Dr. Bougard adds—'I have likewise administered the hypophosphites in cases of advanced phthisis, but these patients were already too far gone to justify me in attributing the want of success to the inefficacy of the medicine.'

528. The following forty-one cases were reported by Dr. Tirifahy, in the paper read to the Royal Society of Medical Science of Brussels ('Journal de Médecine et de Chirurgie de Bruxelles,' August, 1863), which has been already referred to (185):—

CASE LIX.

(1) A merchant, aged thirty, was taken eighteen months ago with the following symptoms:—Great want of breath; cough;

copious mucous or muco-purulent expectoration, great dulness, both before and behind, in the upper third of both sides of the chest; bronchial respiration under the right clavicle and in the supra-spinous fossa; deficient vesicular murmur in about one half of the upper lobe of the right lung; with sibilant and mucous râles both there and on the left side; loss of appetite; great loss of flesh; violent fever every night; night sweats so profuse that his body and bed-linen are wet through each night. No hæmoptysis. After having in vain tried the use of sulphate of quinine and iodide of potassium, I ordered him the hypophosphite of lime. At the end of three months the cure was complete. That is fifteen months ago, and since then there has been no relapse. A few days ago I had an opportunity of auscultating the patient, and found the chest sound. Besides, he is in such condition as to remove all anxiety.

CASE LX.

(2) A clerk, aged thirty-five has been coughing for one month, expectorates thick glairy mucus, sometimes streaked with blood; complains of weight in the chest, and shortness of breath, particularly when mounting a staircase, or even when hurrying on level ground; cannot draw a full breath. He suffers from loss of sleep, and breaks out into profuse perspiration as soon as he doses off. There has been loss of appetite, and very great loss of flesh. There is dulness on percussion; decrease of vesicular respiration and sibilant rhonchi at the top of both lungs. The patient was put under the same treatment as the preceding. At the end of six weeks the patient was restored to the same state of health as he was in before the beginning of his complaint. Lately, that is to say about three months since he began the treatment, I auscultated him, and found his chest perfectly sound.

CASE LXI.

(3) A newly married lady, aged twenty-five, has been coughing for about three weeks. She expectorates thick and tenacious mucus, sometimes a little blood; complains of wandering pains between the shoulders, or under the collar bone, or in the left breast. Even when at rest, the respiratory frequency is very much increased, and is as high as 50 respirations a minute. There are sibilant râles in the upper half of the left lung. Shortly

before I was called in to attend her she was attacked with pleurisy, and there is still some liquid at the base of the left pleura, as is shown by complete dulness and egophony. This effusion had come on by degrees, without the patient having caught cold, and without acute symptoms, pointing to the conclusion that it is the consequence of sub-pleural tubercles. The upper part of the left side of the chest is dull and non-elastic; the ribs and intercostal spaces are very strongly marked; her arms are as thin as those of a patient in the last degree of consumption: the eyes are very bright, and the cheek-bones flushed and prominent: appetite altogether gone. She suffers from vomiting and retarded menstruation, and during sleep perspires profusely about the head and neck. On January 16, in order to produce the resorption of the pleural effusion, I ordered blisters and tincture of iodine to the chest, and prescribed digitalis and kermes internally. This was followed by no good result, so that after using it for a month I prescribed the same treatment as in the former cases. This was rapidly followed by great improvement. Five weeks ago, when I visited her for the last time, there was no morbid sign in the chest, and no other symptom than a few mucous sputa, which were decreasing in number from day to day. I advised her to continue the treatment for one month longer, in order to consolidate the cure.

Case LXII.

(4) A farmer's wife, aged thirty-four, showed the following symptoms:—Want of breath, frequent cough, mucous or muco-purulent expectoration; has several times been attacked with spitting of blood: dulness under both clavicles; at the upper part of both lungs, crepitus and sibilant râles; bronchial breathing in the supra-spinous fossa; her eye is glassy, and she complains of shiverings towards the evening; profuse night sweats; little appetite; digestion difficult, and attended with tympanic distension of the stomach; menstruation diminished, and almost stopped. This took place in the winter, 1862–1863. I kept the patient for about three months under the treatment of the hypophosphites, at the end of which time the cure was complete. A short time ago (1865) I was called to see her for slight disturbance of the stomach, which soon disappeared. She was then the ideal of a healthy and robust countrywoman.

CASE LXIII.

(5) A gentleman, more than fifty years of age, has been coughing for several months, with salivary or mucous expectoration; has had frequent attacks of spitting of blood in large quantities, and complains of great want of breath. Dulness under both clavicles, with mucous and sibilant râles, and nearly complete absence of vesicular respiration. The base of the chest appears sound, but the upper part of both lungs is infiltrated with tubercular matter. Complete loss of appetite, and even loathing of food; the patient is pale and emaciated; utterly unable to sleep. I prescribed the same treatment as in the last case, and placed him upon a diet of milk, eggs, and soup: ordered him to take acetate of morphia each night in progressive doses, to induce sleep. Sleep returned, and with it the appetite also; cough decreased; expectoration diminished; strength returned; and the summer of 1864 was got through without any morbid symptom in the respiratory organs. Last winter I met the patient walking about in all kinds of weather. He says he is well, and has no cough left.

CASE LXIV.

(6) A butcher, aged forty, formerly of athletic constitution, in the beginning of the winter of 1863–64 lost considerably in strength and flesh. He complains of want of breath on the least effort, coughs and expectorates muco-purulent matter in abundance. He looks much depressed, and has no appetite; tongue furred, with the other symptoms of gastric disturbance, which so often accompany pulmonary tuberculosis. The chest shows diminished resonance on percussion, and at the top of both lungs there is great diminution of the respiratory murmur and abundant crepitus. The patient took the hypophosphite of lime for four months, when he said he was cured. Six weeks ago (August, 1865), I examined his lungs, and found them perfectly sound. In flesh and muscular strength he is as good a man as ever.

CASE LXV.

(7) An upholsterer, aged eighteen, has been coughing for about six weeks; has salivary or mucous expectoration, and com-

plains of very great difficulty of breathing. There is great dulness on percussion in the upper third of the chest, and in both supraspinous fossæ intense tubular breathing, amounting almost to cavernous respiration. There are profuse night sweats, complete loss of appetite, and every evening violent and prolonged attacks of shivering, against which the use of sulphate of quinine and arsenious acid have been administered for a week, and are quite powerless. The use of the hypophosphites restored the patient to health in six weeks' time. I often meet this young patient, and he has all the appearance of perfect health.

CASE LXVI.

(8) A farmer's wife, aged forty, complains of want of breath, has been coughing for several weeks, and has brought up sputa streaked with blood. Percussion shows dulness in the upper part of the chest; auscultation gives no abnormal sound, but considerable decrease of vesicular respiration. The appetite is pretty good; but the menstruation has been falling off. The same mode of treatment was prescribed as in the preceding cases. At the end of two months the patient declared she was well. This took place in the spring of last year. She got through the summer and autumn without any return of her morbid symptoms. But in the winter she got an attack of bronchitis, for which she was doctored by the peasants about her or by some water-caster. I have lately heard from a relative of her's that she is now far gone in consumption (166).

CASE LXVII.

(9) A gentleman, aged twenty, of lymphatic temperament and broken constitution, has a cavity occupying the upper lobe of the right lung, the remainder of which is stuffed full of tubercles. The left lung is also slightly infiltrated with them, and is the seat of moist and sibilant crepitus. The patient is almost reduced to a skeleton, and suffers from night sweats and hectic fever. The expectoration is a mixture of saliva, thick and viscid mucus and pus, and so copious that the patient brings up a large soup plateful in 24 hours. Digestion is much impaired; anæmia strongly marked: and the patient is so weak that he could hardly walk across his room. This was his con-

dition on coming under my care at the end of May, 1866. I prescribed the hypophosphites, and under their influence the patient seemed to gain a new life. His strength returned ; he regained his flesh ; the difficulty of breathing diminished, and the patient was able to take walks about the town during the whole summer. All the auscultatory signs of phthisis disappeared from the left lung so completely that two physicians, who at a later period saw the patient with me in consultation for an attack of inflammation in the wind-pipe, agreed with me in finding no signs of tubercles in the left lung. But the disease of the right lung, which had been arrested during the months of July and August, resumed its progress during the cold of September, and the patient died the month following.

CASE LXVIII.

(10) A blacksmith, aged sixty, had exactly the same morbid conditions as the preceding patient, only with less weakness. After three months treatment by the same means the improvement is so great that the patient is confident he will soon be well. He has so far recovered his strength that he has been able to carry on his laborious trade, so to speak as well as formerly. In spite, however, of this improvement which he feels, and which I am bound to admit, I do not feel the same degree of confidence, because all round the cavity which occupies the upper part of the middle lobe of the right lung I find at each auscultation crepitant and sub-crepitant rhonchi, which show that the inflammatory and ulcerative process is still going on. The future will show the results of this state of things (166, 167).

CASE LXIX.

(11) A mason, aged forty-five, has a cavity in the right lung. The supra-spinous fossa is the seat of cavernous respiration and pectoriloquy, sometimes accompanied with cavernous gurgling. There is great diminution of the respiratory murmur at the top of the left lung. The patient is out of breath with the least exercise. He has lost his appetite and muscular strength, and suffers at night from attacks of shivering and profuse perspiration. He has been kept under the treatment for six weeks. The last time I saw him, which was a few days ago, he was to all

appearance in perfect health, but the cavity is still there, and secretes every morning a few thick sputa. This to the patient is a slight matter, which he seems to think little of, as long before he thought himself ill, he coughed and spat quite as much, so that as far as his health is concerned, he is not very exacting. I must say, however, that in this instance there are not the morbid stethoscopic signs around the cavity which were noted in the preceding case. I suppose that is a favourable circumstance, which will allow the patient, if no accident occurs, to live on (155). On my last examination I could find no morbid sign in the left lung (153).

Case LXX.

(12) A gentleman, aged sixty, is in the same case as the three preceding patients. I have known him for three years, and have attended him from time to time. In his case the cavity is in the left lung. The right lung, which was also diseased, has become sound, and has remained so up to this time (153). But the cavity has destroyed nearly the whole of the left lung. The patient sometimes brings up enormous quantities of pus; and in that case there is loud amphoric respiration from top to bottom, and both before and behind on the left side of the chest. This side has lost nearly one-half of its capacity by the flattening and sinking in of the ribs. The right side on the contrary has become enlarged, and has undergone a kind of hypertrophy. Six weeks ago the patient was attacked with diarrhœa, swelling of the feet and very great loss of flesh, which I considered an index of his speedy end. I was mistaken. The diarrhœa was arrested by the use of sub-nitrate of bismuth and morphia. Bark, iron, and nutritious diet have restored the patient's blood and strength; so that there is no reason why his life should come to an end, so far as the pulmonary affection is concerned. The treatment by the hypophosphites was followed for about eight consecutive months. Since then it has been occasionally resumed or omitted according to my prescriptions.

Case LXXI.

(13) A cavalry officer has been consumptive for a long time. I have been attending him for four years, and when first called in

found there was a cavity about the size of an egg at the top of the right lung. In other respects he was in the same condition as cases 66, 67, 68, and 69, that is to say, his left lung was also diseased, with this aggravation that he was also suffering from chronic laryngitis. He had had frequent attacks of spitting of blood, which have been of long duration. He was put under the same treatment and made notable improvement. When last I saw him, a short time ago, I found that the left lung was healthy (153), and a few days since I met him in town walking smartly along. He looks so well that no one would guess that there was anything the matter with his chest.

CASE LXXII.

(14) A sempstress, aged twenty-five, of scrofulous temperament, as manifested by a string of scars round her neck, showed three months ago signs of a cavity on the right side, and of general tubercular bronchitis. At this time she was suffering from abundant spitting of blood, which lasted several days. Under the use of the hypophosphite of lime, the greater part of the lung now fulfils its functions as in the healthy state. She has recovered her strength, and has gained so much in flesh that the whole system appears to be in a very satisfactory state. The patient hopes to be very soon cured, and I would willingly take the same view were it not for the slow but continuous extension of the cavity.

CASES LXXIII. AND LXXIV.

(15) A married lady of twenty-five, and an unmarried lady of twenty, have both the same symptoms of pulmonary tuberculosis; such as loss of flesh, repeated attacks of shivering by day, increasing towards night; profuse night-sweats; great brilliancy of the eyes; little or no appetite; yellow tongue; impaired digestion; respiration so much impaired that they cannot take four steps without being out of breath; they complain of erratic pains and a great feeling of weight in the chest; there is decreased resonance on percussion; diminution of respiratory murmur; but no abnormal respiratory murmur except a few sibilant râles scattered throughout the lung. Every morning there is an expectoration of mucous sputa; menstruation regular, but scanty; no abnormal sound of heart or large

vessels. The hypophosphite, which was given for ten months in the first instance and three months in the second, produced considerable improvement in the general condition, appetite, strength, and flesh. The difficulty of breathing diminished without entirely disappearing. The expectoration was only considerably improved, that is to say, the sputa are not so numerous. The chest remains deficient in resonance and elasticity. In a word, after a long treatment, these patients are better, but far from being well (156, 162).

CASE LXXV.

(16) A butcher, aged thirty, consulted me at the beginning of 1864 with the following symptoms:—Great shortness of breath, cough, sero-mucous expectoration, sometimes streaked with blood, decreased resonance on percussion at the top of the lung on both sides, with mucous and sibilant râles: bronchial respiration in some parts, and general decrease of respiratory murmur. The cheek-bones are red and prominent; eyes very brilliant; he complains of night sweats; his hair is falling off in quantities; bad and variable appetite, and laborious digestion. He took the hypophosphite of lime for about three months. At the end of that time all the symptoms had considerably improved, so much so that during the summer the patient thought himself well. He confesses, however, that he easily takes cold, nevertheless he has stood the severe winter we have just gone through, and has resumed the treatment during that time. A few days ago (August 1865) I saw him again. He is in the enjoyment of very satisfactory health, and expresses himself delighted at the condition he is in. There are, however, still tubercles in a crude state (154, 156, 162).

CASE LXXVI.

(17) A plate-layer, aged thirty, was attacked several times three years ago with severe hæmorrhage, which left him in a complete state of anœmia. The upper part of both lungs was literally stuffed full of tubercles. He first took the hypophosphite of lime for six consecutive months; then from time to time for a fortnight or a month together. The surgeons of the railway had certified his absolute incapacity ever to be able to

resume his work, and he had been pensioned off by the company. His condition has now so far improved, that he is able to return to his laborious occupation. However, he is not cured; he still coughs and expectorates, and under the right clavicle there is rather a large surface with deficient resonance, where on auscultation the air is found hardly to penetrate the lung, and which is the seat of well-marked crepitus. In the rest of the chest about a month ago I hardly found any abnormal modification of the respiratory murmur (156).

Case LXXVII.

(18) A cabinet-maker, aged fifty, presented all the symptoms of tubercles in the first stage. For six weeks I prescribed the same remedies as I had done to the preceding patient. But during that time I was frequently obliged to omit the remedy, after it had been taken for three or four days, because the patient at three different times was taken with spitting of blood. Whether this was a mere coincidence or was owing to the hypophosphite I cannot say, but as I found out that the patient was being prescribed for by another physician, I gave him up and lost sight of him (201, 205).

Case LXXVIII.

(19) A young gentleman, of twenty years of age, fair-complexioned, and of lymphatic temperament, about eight months ago, had both lungs filled from base to summit with tubercles in the second stage. There were shiverings; night-sweats; indigestion; loss of appetite; vomiting; cough; thick copious expectoration; complete dulness at the top of both lungs; and decreased resonance in the remaining portion; throughout sibilant, mucous, and sub-crepitant râles. The patient's weakness was so great that he could hardly walk to my house, a distance of about 300 yards. Since then, for eight months past, he has been taking the hypophosphite of lime, and more than half of the pulmonary tissue has recovered its permeability to air (153). The patient's appetite is good. He has regained his flesh, and is able to ascend the stairs without much fatigue. He has hardly any night sweats, but still coughs and expectorates. I hardly reckon upon a cure, although I cannot find any signs of a cavity.

CASE LXXIX.

(20) A musician, aged twenty-five, had cavities in the lungs, with urine so highly albuminous that it is likely there were tubercles in the kidneys. He took the hypophosphite of lime for six weeks, but without any effect, either good or bad, and died (Case CLXXII.).

CASE LXXX.

(21) A lady of twenty-five years of age, addicted to spirituous liquors, was attacked with numerous pulmonary tubercles in the first stage. She took the hypophosphite of lime for two months, without any result. At the end of this time she was attacked with tubercular meningitis, which, in spite of antiphlogistic and mercurial treatment, carried her off in a fortnight.

CASE LXXXI.

(22) A lady's maid, aged thirty-seven, of highly lymphatic temperament, was suffering fifteen months ago from a large mass of tubercular deposit in the first stage, in the upper part of both lungs. She took the hypophosphites for about three months, and during that time her condition was greatly improved. But during the summer, which she spent in the country, *the treatment was omitted* (166, 169), and when I saw her again in the winter I found that cavities had formed, which continued to increase in spite of the hypophosphite, which I again prescribed. This was followed by tuberculization of the intestine, and the patient died.

CASE LXXXII.

(23) A merchant, aged twenty-eight, had at first only one lung, the right lung, diseased, but went through the same circumstances as the preceding case. For more than six months, during the whole of last summer, he thought himself cured. But when I was called to attend him, at the end of the winter, I found that cavities had been formed, and that the patient was suffering from tubercular laryngiti and enteritis, fistulæ ani and abscesses of the neck. Of course I gave up all idea of at-

tempting to cure such a case, attended only to the symptoms, and the patient died.

Case LXXXIII.

(24) A young woman of twenty-five was suffering from tubercles in the first stage in both lungs. She took the hypophosphites for five or six months, and, in spite of the winter, with evident improvement both in the lungs and general condition. *She has left off the medicine for more than a year*, since which time she has been attacked with hæmoptysis, and an enormous cavity has formed in the left lung (166, 169).

Cases LXXXIV. and LXXXV.

(25) Two young men, one aged twenty-seven, the other twenty-five, were both attacked with tubercles in the first stage. These morbid products, which at first seemed to be few in number, were disseminated throughout both lungs. Auscultation and percussion give but slight indications, only a few sibilant râles of variable seat. The use of the hypophosphite of lime does not prevent the disease from making rapid progress. New tubercles were deposited in the lungs in such abundance that the patients died, one at the end of two months, and the other at the end of six months, rather owing to asphyxia than to the breaking down of the tubercular deposit. I could find no signs of cavity in either; one of them, while under my treatment, was for a long time put through a course of electrical gymnastics (470 A, 535, 538, 539).

Case LXXXVI.

(26) A butcher had crude tubercles in both lungs. Dulness under both clavicles and in the left supra-spinous fossa; bronchial respiration in this latter region; and moist crepitus and sibilant rhonchi in the two upper thirds of the chest. The expectoration is by turns thick or tenacious. He complains of night sweats, and there is very great emaciation. He is also suffering from laryngitis, and at times the voice is almost entirely gone. For the last four months he has been taking the hypophosphite of lime with tincture of benzoin, and, from time to time, the bromide of potassium, to diminish the irritability of the wind-pipe, which is cauterized once a week with a

solution of nitrate of silver (¼ or ⅛ strength). At the time of writing this observation (May 4) I have re-examined the patient. Respiration is now heard throughout the whole pulmonary tissue (153). The inferior lobes are sound; the air enters easily the upper lobes; although here and there a moist or sibilant râle may still be heard. But the bronchial respiration has disappeared, and the dulness is much improved. The expectoration is reduced to a few sputa daily. Four months ago it was more than a plateful. The wind-pipe is nearly well, and the voice is as distinct as it ever was. This is one of the best proofs of the improvement in the lungs.

CASES LXXXVII., LXXXVIII., LXXXIX., XC.

(27, 28, 29, 30) A stone-cutter, aged eighteen, a man-cook, aged twenty-two, a sempstress, aged thirty-four, and a hotel keeper, aged forty, all had tubercles in the first or second stage. All took the hypophosphite of lime for months together, without any effect good or bad. The tubercular disease progressed as if there had been no treatment at all (99, 185, 187, 470 A, 539).

CASES XCI., XCII., XCIII., XCIV., XCV., XCVI., XCVII., XCVIII., XCIX., C.

(31, 32, 33, 34, 35, 36, 37, 38, 39, 40) Lastly, I have a series of ten patients, whose ages varied from eighteen to sixty-five, all with cavities more or less extensive, and all with symptoms more or less marked of consumption in the third stage.

In all these cases the use of the hypophosphite of lime was followed by rapid aggravation of all the symptoms, and particularly with excitement of the circulation and calorification; thus proving that there was an increase of the ulcerative and suppurative processes. As I was convinced that by continuing the remedy I should hasten their end, I left off the hypophosphite, and used nothing but palliative means until their death (104, 185, 200).

529. Dr. Henry Bennet reports in all ten cases, including his own, as having been cured by him, stating that they were only a selection from a larger number, and adding, that as 'case reading is proverbially tedious, he has

avoided as much as possible the circumstantial enumeration of local symptoms, which are much the same in all cases, as also the details of treatment.' For the latter he refers to the preceding pages of his book, as all were treated on the principles therein detailed, which, as the reader will see by referring to Chap. ix. (491), means simply the hypophosphites.

CASE CI.

DR. HENRY BENNET'S OWN CASE.

At thirty-eight I had a classical attack of acute gout, followed by obstinate bronchitis and laryngitis. These ailments, limited at first to the winter, then continued throughout the summer, existing simultaneously with symptoms of chronic gout. The constitutional health had also been lowered by repeated attacks of blood poisoning after *post mortem* investigations, etc. Shortly after the last poisoning I had a severe attack of subacute general bronchitis, which continued with abundant purulent secretion throughout the summer months.

Thinking my state suspicious, I consulted my friend Dr. Richard Quain. He examined me most carefully, in August, and found no evidence whatever of lung disease, with the exception of general bronchitis. His words to me were, 'The gout is the diathesis to treat in your case.'

The treatment seemed to answer admirably. I gradually lost all the symptoms of chronic gout, but I did not lose the cough and expectoration. This, however, caused no alarm, for I thought it gouty, and although friends said that I looked thin and ill I laughed at them. A few months later, in February, 1859, I was seized in the night with hæmoptysis, losing at least a pint of blood. The next day, on examination, Dr. Quain found extensive phthisical deposits in the upper regions of the right lung, extending posteriorly to the angle of the scapula, anteriorly from the clavicle to the third rib. This deposit was softening in various regions. I had clearly fallen from Charybdis into Scylla. Whilst I was treating the gouty element, the phthisical one had developed itself. By Dr. Quain's advice, I changed the tactics, took cod-liver oil, threw up midwifery, and slept all but constantly at my country house, twenty miles from London. But all to no purpose; the disease continued to progress. Dr. C. B. Williams, whom I saw, confirmed Dr. Quain's statements. On my asking him whether there was evidence of disease in the left lung, he replied that no doubt there was; but that the mischief was so extensive and so advanced in the right lung that there was no longer any basis for comparison. Thus it had become difficult to speak with precision.

I thought myself lost, and had made up my mind to die in harness, but when the summer heats came the morbid deposits softened still more, hectic fever and night sweats set in, and I became quite incapable of attending to professional duties. Thereon Dr. Quain drove me away to the north to escape the heat and for rest, and I went direct to Edinburgh to my namesake and friend Professor Bennett. He confirmed previous opinions, told me that I had two cavities in the upper lobe of the right lung, one anteriorly large, the other posteriorly smaller; and that if the disease continued to progress as it was then progressing I should be dead and buried in less than a twelvemonth. At the same time he advised me to struggle for life, to give up practice entirely and immediately, and to go to the South of Europe for the winter. He added that he had seen some persons as bad as I was recover (35), and that it was consequently worth while to give battle to the disease. Should I be one of the fortunate ones, I might return to consulting practice in a cautious way.

This advice I followed to the very letter, and thereby, no doubt, saved my life. I went from Edinburgh to Loch Awe to boat and fish, whilst my friends in London were winding up my affairs. That done, I departed for the Riviera which I had previously visited, as a healthy tourist, free from all professional ties and duties, present and future, and there settled at Mentone. For two years I entirely avoided professional occupation of any kind, spending the winters on the Riviera, the summers fishing on the Scotch lochs. I had not been three months at Mentone before I began to improve in general health and locally (491). At the end of two years I was quite convalescent, and cautiously resumed consulting practice, at Mentone in winter, in London in summer.

With improvement, however, came a sensation of lassitude and prostration, which showed me that I was still under the influence of the tubercular or phthisical cachexia, and this conviction has contributed to keep me out of the arena of active professional or social life. Within the last two years, to my utter astonishment, it has left me, showing what perseverance in a hygienic life can do, even after ten years of disease and debility. During the early part of the twelve years that have elapsed since I abandoned the duties of active life, I had ups and downs—several relapses and a couple of hæmorrhagic attacks, like all similarly affected, however favourable the results of treatment—which it would be too tedious to dwell upon. Suffice it to say that I was for years a confirmed invalid, and that the second winter, after an accidental illness, disease appeared in the left lung, that as I got better, as cicatrization took place in both lungs, I became rather asthmatic, especially under the influence of colds; and that even now I use my recently-gained strength with caution.

Dr. Quain tells me there is still unmistakable evidence of past mischief, especially in the right lung. He finds in its upper region a dry cavity into which the air enters with a sound like 'air whistling through a keyhole.' There is all but absence of the normal vesicular murmur in the upper lobe of this lung, no doubt from a secondary emphysematous state of the pulmonary cells around the cicatrized regions. Otherwise I am told that I have lost the look of the invalid and I feel in fair average health for a man of my years, although profoundly conscious of the past lung mischief on the slightest exertion. A common cold brings on severe pain in those regions. I think, however, I may look on my case, without too much complacency, as one of cured phthisis. Since I have lived this cautious, hygienic life, I have seen many of my strong healthy professional friends who pitied my downfall succumb because they have not had the courage I had, or perhaps because they had not a true energetic friend like Professor Bennett to put the naked truth before their eyes and to encourage them to make the necessary sacrifices regardless of their feelings at the time.—'Bennet on Consumption,' 2nd edition, 1871, p. 145.

It may not be out of place to repeat here as the only necessary comment upon the preceding case the following statement to which not the slightest allusion is made in the above report: 'Were I only to report the successful cases that I have had under my care, the cases in which the lung disease has been arrested and even cured, I could quote many instances of cure, *myself included*, which have apparently taken place under the influence of the hypophosphites, as they were long and constantly administered. But,' &c. For the rest the reader is referred to Chap. ix. (491).

530. Dr. J. C. Thorowgood, Member of the Royal College of Physicians, London, Physician to the City of London Hospital for Diseases of the Chest, Lecturer on Materia Medica at the Middlesex Hospital, etc., has published a small work on 'Consumption, and its Treatment by the Hypophosphites,' containing two series of cases, which has gone through two editions, from which I have already made copious extracts, and in which most of my views meet with full confirmation. When Dr. Thorowgood's line of conduct is contrasted with that of some other physicians, the reader, who in the present instance will probably be the person most interested in the subject, cannot but feel grateful to him for the care and accuracy with which his researches have been carried out. I only wish to make one remark upon Dr. Thorowgood's reports, and that is, that I have no doubt his success would have been greater still if he had always limited himself exclusively to the use of the hypophosphites, unless, as I have said, it was necessary to fulfil some special and positive indication (215 B). This rule has usually been followed by continental physicians. It may sometimes be difficult to do so with English patients, for the reasons already pointed out (219). This remark specially applies to cod-liver oil. If we wish medicine ever to become a positive science we must give up this system of compromise and not prescribe a thing merely because it *seems* to do no harm (211, 444).

The following are Dr. Thorowgood's first series of cases, which, as he states, were only a selection from a much larger number:—

'I have,' says Dr. Thorowgood, 'within the last two years amassed the notes of a large number of cases in which the hypophosphites were administered, often under every extraneous disadvantage; and in very many of these cases, decided and unmistakable good came of their administration, and that too *when other well devised means of cure had proved useless.*'

CASE CII.

(1) Rosa G., married, æt. thirty-five, living in the City, came to me on August 3, 1863, stating that she had been ailing for more than four months with general debility, some loss of flesh, and a troublesome cough every morning when she rises.

She has never coughed up any blood, but usually expectorates a grey phlegm. Has much tightness and oppression at the chest, at times is feverish. Pulse 100, feeble.

Physical signs.—Right subclavicular region is duller than the left, and the breath sound here harsh and tubular; elsewhere chest seems sound. Ordered nitric acid in infusum aurantii till August 11, when she was again seen, and the cough was found to be better, but there was much dyspnœa on any exertion, with feeling of sinking and weakness at the chest. Cod-liver oil was strongly urged upon her, but she has often tried it in various ways, and is scarcely able to keep one dose on the stomach.

Under these circumstances she got:—

℞ Sodæ hypophosphitis, gr. iij.;
Tinct. camph. co., ♏x.;
Aq. camph., ℥j. M. ter die.

This mixture was taken up to August 18: at first it caused slight nausea, but soon it was easily taken, and in one week more the patient came to say she was free from cough, could breathe well, and required no more medicine.

February 10, 1864.—The same patient came to me with much dragging pain in the chest, cough, quick pulse, and emaciation. Breath sounds very tubular at right infra-clavicular region, and pain here as well as on left side.

℞ Sodæ hypophosphitis, gr. v.;
Infus. calumbæ, ℥j. M. ter die.

February 18.—States that the mixture soon relieved her chest; to continue it, and to take ʒj, of cod-liver oil twice daily.

March 3.—Feels almost well, and is going for change to Ryde. Since then I have not heard of any relapse.

CASE CIII.

(2). Mary G., æt. thirty-nine, out-patient at Hospital for Diseases of the Chest.

January 4, 1864.—Complains chiefly of much tightness and oppression at the chest, with a troublesome cough and difficult expectoration; never raised any blood.

Physical signs.—Nothing more noted than prolonged expiration under right clavicle, and very slight dulness here.

Till February 13th the treatment consisted in expectorants, and then tinctr. ferri c. liq. morphiæ, but none of these medicines appear to have given any relief to the symptoms, and she got on February 13th:—

℞ Sodæ hypophosphitis, gr. v.;
Aq. menth. pip, ℥j. M. ter die.

February 22.—Finds so much relief to the cough and chest oppression that she asks to be discharged now, as she feels well.

The respiratory signs, however, are not altered, and the morning cough with expectoration continues, though in less degree.

Repeat mixture for fourteen days, and return if not cured. She was not seen by me again.

CASE CIV.

(3) Jane C., æt. twenty-one, dispensary patient, complains of much debility and exhaustion, and frequent dry hacking cough; tongue white, appetite bad, a good deal of pain about left shoulder. Pulse 120.

Physical signs.—Harsh and coarse breathing at left infraclavicular and supra-spinous regions; nothing else noted.

℞ Acid nitric dil., ♏ x.;
Dec. cinchon., ℥ j. M. ter die.

In a week she felt stronger, but the cough was worse, and the scanty sputa visibly streaked with blood.

℞ Sodæ hypophosphitis, gr. v.;
Aq. camph., ℥ j. M. ter die.

After ten days of this, she came and said the medicine revived and strengthened her, cough and spit very much better. She continued taking some medicine a few weeks longer, and then left off attending. Pulse being then 80, and the cough a mere nothing.

Case CV.

(4). Eliza D., æt. nineteen, weak young woman, suckling an infant. Since confinement has complained much of oppression and tightness of the chest with frequent cough.

The left apex is duller than right, and respiration very jerking and uneven, chest feels tight and stuffed.

For three or four weeks the treatment consisted in the application of tr. iodin. to the left chest, and in the administration of cod-liver oil and chalybeates. At the end of a month the notes before me record no improvement, and it appears that on October 22 five grains of hypophosphite of soda were given in aq. camphor. thrice daily, and the oil continued.

November 5.—Great improvement, less pain in chest, breathing free.

November 29.—Has continued the hypophosphite, and considers herself well.

Case CVI.

(5) Elizabeth F., æt. twenty, living in Essex, came in July 1863, to the Hospital for Diseases of the Chest at Victoria Park. Pale complexion, has been getting weak and losing flesh, with frequent cough and pains about the chest.

July 23.—She was examined by Dr. Andrew, and the note of the physical signs was:—Tubular respiration with increased vocal resonance at right apex. On her being passed over to me soon after, I treated the case with cod-liver oil, nitric acid, and bark, then with syr. ferri iodid. for nearly two months, till towards the end of September the patient began to spit blood, and to show signs of the left apex being congested.

October 8.—I gave her three grains of the hypophosphite of soda thrice daily, with twenty drops of ether in aq. camphor.

The amendment was marked and persistent, so that on November 2 she was discharged, and I noted that in this case the physical signs underwent much improvement under the hypophosphite treatment.

CASE CVII.

(6) A widow, æt. twenty-seven, resident in the country, was sent as an out-patient to Victoria Park Hospital, having been under treatment for presumed tubercular disease of the left lung.

When seen, face was flushed, and pulse 130. She complained of frequent cough with thin expectoration, pains about chest and shortness of breath. No hæmoptysis.

Physical signs.—Some dulness at left infra-clavical region, with very harsh breathing. She has undergone much treatment, but has never been able to take cod-liver oil.

℞ Sodæ hypophosphitis, gr. iij;
Infus. calumbæ, ℥j. M. ter die sumend.

After three weeks, came and said she felt better; pulse 120; less spit, less pain; physical signs as before. Pt. med.

In another three weeks, further improvement, and she can take a teaspoonful of oil twice in the day.

This report was given by her on December 17, 1863, and she was not again seen till April 25, 1864, when she presented herself much worse in every respect.

Note of April 25, 1864, runs thus:—She feels very weak and prostrate; at times is burnt up with fever, and at night is drowned in perspiration; severe pain on left side when she breathes, and coughs up much thick spit that sinks in water; once or twice coughed up blood. Pulse 120, weak and irritable; tongue much furred behind.

Physical signs.—Upper left chest very tender; moist crackling distinct; right supra spinous fossa dull, and the breathing bronchial.

Requests some of the same medicine she had before, which did her so much good. She gets accordingly—

Sodæ hypophosphitis, gr. v.
Infus. calumb., ℥ j. M. ter.,
and ʒ j. of pale oil twice daily.

May 3.—Much the same. Pulse 118; much pain in chest, and 'very heavy night sweats.'

℞ Calcis hypophosphitis, gr. v.
Infus. calumb., ℥ j. M. ter die sumend.
Pulv. ipecac. co., gr. v. Omni nocte.

With the exception of a week of rest from physic, the patient took the above mixture till May 23, when, in her own words, she felt 'a new being,' with clean tongue, pulse 88, no pain, and respiration greatly improved; slight cough and scanty expectoration.

Some months after, when engaged in the election of a child into a charitable institution, she casually called upon me, and seemed well.

CASE CVIII.

(7) A little girl, æt. fourteen, coming from Kent, presented on October 19, 1863, all the signs of very incipient phthisis in the left lung. Pulse 130; much cough at night; no hæmoptysis.

Physical signs.—Slight dulness at left infra-clavicle region, and uneven tubular respiration. Nothing further.

Alkalies with bitters, cod-liver oil, and chalybeates were given till December 7, when, as there seemed no improvement, she was ordered

Sodæ hypophosphitis, gr. iij.
Infus. calumbæ, ℥ j. M. ter.
Ol. morrh. ʒ ij. Ter die.

After intervals of this medicine, with applications of iodine over left infra-clavicle region, she improved gradually, and on

July 15, 1864, was finally discharged, apparently cured.

I heard of her in August, 1865, as keeping perfectly well in all respects.

CASE CIX.

(8) The next case is one at present under observation, in consequence of the patient having had a return of consumptive

symptoms after they had been completely arrested during fourteen months by means of the hypophosphite of soda alone.

Frederick A., æt. thirty-six, a labourer, living in Bethnal-Green, came to Victoria Park Hospital, March 28, 1864, and gave the following account of himself and his ailments:—

He has, till ten days ago, had as good health as any man living, his weight at one time was fourteen stone, and he could run up hill, or raise a heavy weight, without anything like dyspnœa.

Shortly before his coming as a patient, after a day of no special exertion or excitement, he awoke at two in the morning with a fit of coughing, and soon began freely to expectorate florid blood. This cough and bloody expectoration kept on at intervals for about a week, and then he sought advice.

The notes of March 28, 1864, are scanty, and run thus: Pale and anxious face, clean tongue, feeble pulse, much cough with sanguineous sputa.

Physical signs.—Right infra-clavicular region decidedly dull, and moist sounds heard. Ordered, a mixture with dilute sulphuric acid and syrup of poppy.

April 11.—Not much better. Chest feels very stuffed. Cough is troublesome, and the sputa mixed with blood.

℞ Sodæ hypophosphitis, gr. v.;
Glycerin, ♏ xx;
Aq. ℥j. M. ter die.

He took this up to May 16, 1864, without any cough pill, or cod-liver oil, and by degrees the cough and spitting left him, and he returned to his work, having lost all cough, all spitting, and with a greatly improved appetite.

October 9, 1865.—This same man came again to the hospital, and confirms the literal truth of the last note made of his case. Since then he has remained so well that he has not lost one day's work; but during the last week the cough has returned, and the sputa is again very much mixed with blood. He feels much oppression at the chest, chiefly on the right side, and here there is dulness and numerous humid clicks. The respiration in the left lung is very feeble.

Tincture of iodine applied to right chest, and five grains of hypophosphite of soda given three times a day in camphor water.

October 16.—Feels much better. After three days of the mixture the cough was better, and the sputa free from blood. Pulse 84, tongue clean, looks pale and thin about the face, and says he has emaciated a good deal lately.

Continue medicine and take ol. morrh. ʒ ij. ter die. He could not take the oil, but has since returned to work quite well, and perceptibly gains flesh.

Case CX.

(9) William P., æt. fourteen, living at Plumstead, came to Victoria Park Hospital, December 14, 1863, in the following state:—He is a pale, thin lad, complains of constant cough with much expectoration, loss of flesh and strength, and frequent attacks of diarrhœa.

Physical signs.—Left chest is flattened, very dull on percussion, and its upper half is full of moist crepitation. Right lung expands fairly, respiration in it is harsh, and expiration notably prolonged at infra-clavicular region. He states that he has been ill for three years, and has taken much cod-liver oil.

℞ Ol. morrh. ʒ ij. ter die.
Calcis hypophosphitis, gr. v.;
Decoct. cinchon., ℥ j. M. ter die.

December 21.—Much the same; continue for fourteen days.

January 11, 1864.—Feels much better. Pulse 96, spit is very much less. Diarrhœa ceased.

25.—Progressing well. Pulse 96. Much less moist sound in left lung, but at one spot respiration is very bronchial as if a small cavity had formed. The boy looking very pale and anæmic, got in place of the hypophosphite and bark,

Tinctr. ferri. ♏ x.;
Infus. calumbæ, ℥ j. M. ter.
Pt. ol.

February 8.—Decidedly worse for the change in the medicine. Diarrhœa returned and pulse risen to 100. Cough and expectoration not increased. Resumé hypophosphite and bark as before.

He soon improved again, lost his cough, gained flesh and strength, and on April 4 he was let go with a quinine mixture to take for a fortnight.

The moist sounds in the left lung were almost gone, but the bronchial breathing over a small space made me think a cavity must have formed.

Nothing more was seen of this patient till May 15, 1865, when he again presented himself. He says that after his discharge on April 4, 1864, he kept in good health up to six weeks back, when the cough returned, with profuse expectoration, and sickness and vomiting. Diarrhœa also has of late troubled him much.

The signs of a cavity in the left lung are most unmistakable now, and some moist clicks are distinct in the right lung. Pulse 124. Ordered ol. morrh. ʒ ij. ter die., and tinc. ferri c. liq. morphiæ for fourteen days.

May 29.—No better in any respect; vomits his food when he coughs.

Continue the oil and take, in place of the morphia and steel mixture,

Calcis hypophosphitis, gr. iij.;
Decoct. cinchon, ℥ ss. M. ter die.

June 12.—Much better; less cough, less expectoration, and no diarrhœa; continue treatment for a fortnight.

He improved considerably, but left off attending before I was at all satisfied as to the disease being fairly arrested.

Case CXI.

(10) Early in January, 1864, a pale, emaciated man, not long out of the workhouse, came to me as an hospital patient, and told me that his illness commenced nine months back, with attacks of profuse hæmoptysis. From that time to this he has been losing strength and flesh, has much cough with often bloody expectoration, and is so short breathed that he can hardly walk across the room, and can speak but few consecutive words at a time. Pulse 124; tongue large and clean.

Physical signs.—Breathing very bronchial at right infraclavicle, with moist sounds, and also at right supra-spinous fossæ; bronchophony decided in both these places. The lower part of the left lung seems the seat of some congestion, as evidenced by impaired resonance, and a good deal of fine crepitation at its base.

There was probably at this time some sub-acute pneumonia going on in the left lung. This would to some extent account for the great dyspnœa of the patient on moving. He received a liniment, cod-liver oil, and five grains of hypophosphite of lime, to be taken thrice daily in camphor water.

By January 23 he had made great and unmistakable improvement, and the left lung seemed much clearer. To continue mixture and oil.

This man, though living in great poverty, continued, with a few short intervals, the treatment by the hypophosphite of lime with cod-liver oil, and now and then a chalybeate mixture by way of a change, till September, 1865, when he felt so well and strong that he returned to his work as a weaver, the cough scarcely troubles him, and he has now no hæmoptysis, but his breath is short, and there seems a quiescent cavity in the top of the right lung.

Case CXII.

(11) Mrs. A., æt. thirty-six, in comfortable circumstances and the mother of several children, came to me on December 29, 1864, with the following history of the commencement of her illness:—

She has always been delicate, and had a cough with expectoration, often sanguineous, for several years; about two months ago she was confined, and soon after her chest troubled her very much, and the two medical men who attended her agreed that the right lung was much congested in its upper part.

After her previous confinements she has been troubled from the glands in the neck swelling, and more than once suppuration has taken place, but after this confinement nothing of the kind took place, while an obstinate cough with bloody expectoration hung about her most persistently.

The appetite is fair, but there is a bitter taste in the mouth, and she is liable to bilious attacks, and quite unable to bear the smallest dose of cod-liver oil. The tongue is large with furred centre, and red edges. Pulse 108, feeble.

Physical signs.—Right lung seems improving, the percussion note is rather dull, in parts breathing is extremely feeble, at other parts it is tubular.

Left lung is noted as 'suspicious,' at the acromial angle clicking sounds can be heard.

℞ Sodæ hypophosphitis, gr. v.;
Sodæ bicarb., gr. x.;
Infus. calumbæ, ℥j.—M. ter.

January 2, 1865.—Less tightness about the chest, less palpitation of the heart, cough and expectoration very troublesome. Pulse 104.

Continue the same mixture.

The medicine was continued till February 6, when she felt herself almost well, very little cough, and hardly any expectoration. She remarks that her spirits are much better. Respiration in the right lung is still feeble, but the left seems quite sound.

March 6.—She was seen, and then had at times a little cough in the morning, otherwise she seemed in good health.

It is well-known that consumptive females are apt to experience a fresh start of the disease soon after their confinement, this being probably due to an excess of plastic material being thrown into the circulation, and this not being properly eliminated, is deposited in the lungs as tubercle. This patient, in addition to increase of chest symptoms after previous confinements, had suffered also from suppuration of the cervical glands, and thus probably an outlet was afforded to tubercular mischief in the constitution. At this last confinement there was none of this gland affection, while the chest symptoms were more threatening than on any previous occasion. In the treatment nothing was given except the hypophosphite of soda in an alkaline infusion of calumba, and the result was all that could be desired; what few suspicious signs there were in the left lung went quite away, the tubular breathing in the right lung got much better, though the general feeble breathing in this lung will probably always continue to exist.

Case CXIII.

(12) John H., æt. eight years, of remarkably strumous aspect, came with his father to Victoria Park Hospital, September 22, 1864. Has been ill for several weeks with cough and expectoration, and has rapidly lost flesh and strength, he has never coughed up any blood, and his present ailment is believed

to have commenced with a cold. Cough, pulse is 120, tongue clean and moist, skin cool.

Physical signs.—Left lung good; right dull on percussion, and abundance of crepitation heard all over its upper third.

℞ Sodæ Hypophos, gr. iij.
Infus. Serpentariæ, ℥ ss. ter die.

with lin. terebinth. to right chest.

September 29.—Less moist sound in right lung, and general state improved. Tinct. iodine applied over right front, and a teaspoonful of cod-liver oil given three times a day; continue mixture.

In a month from this time he had gained flesh and strength, could breathe freely, and the only physical sign noted was harsh respiration over the right chest.

CASES CXIV. AND CXV.

I have not room to give the notes of two other cases remarkably similar to this one.

(13) In the one, a long and most judicious course of treatment had been for a long time followed to no purpose, while the hypophosphite of soda in six weeks' time had cleared off all the moist sounds from the lung, and made the patient feel quite well enough to resume his duties as landlord of a country inn.

(14) The other was the case of a small boy, and the hypophosphite and sea air must divide the credit of a most satisfactory result between them in this case; a few moist sounds can yet be heard at the top of either lung.

Dr. Thorowgood adds the following remarks, 'Not to occupy attention with the details of more cases, I would just say that those already recorded are taken from 115 cases of phthisis, treated partly or entirely with hypophosphites, of which I have kept notes, and out of this number I have been able to set down twenty as most decidedly and permanently benefited by the use of the hypophosphites of soda and lime. In five of these, cavities seemed to have formed, and in the other fifteen the disease had in every instance gone to the extent of producing moist sounds in the respiration varying in extent and degree. In thirty-four other cases, where the evidence of the disease was very decided, great relief was gained from the hypophosphite treatment, more, perhaps, than by any other medicine employed.

'Of the remaining sixty-one I can only state that nothing very noteworthy is to be said, many of these were not regular in attendance, about twelve were very doubtful cases as to the real establishment of phthisis, and in some five or six that were certainly phthisical, the hypophosphite of soda seems actually injurious, one man with the disease in the second stage in both lungs nearly always found the hypophosphite to cause hæmoptysis, others said it seemed "very trying to the chest," but this is the worst I have to tell of my experience of the hypophosphites (470 A).

'Of the 115 cases of which I have kept notes, 100 certainly were true cases of phthisis in various stages of the disease, and, as has been already stated, twenty of the patients derived so much benefit as to be able to go about their usual occupations and desist from medicine. One of them, a case with extensive disease in the left lung, has lately shown a tendency to relapse, but the very unhealthy locality in which this patient dwells, and other unfavourable circumstances, must to some extent answer for this relapse.'

Dr. Thorowgood prefaces his second series of cases, published in 1868, with the following remarks:—

'Having now been in the habit of using the hypophosphites pretty frequently during the last five years, I am able to say that my faith in their remedial power becomes more and more confirmed, while I recognise the fact that they require to be given with discrimination and care, otherwise not only no benefit but actual mischief will result from their administration' (158, 192, 199, 200, 202).

CASE CXVI.

(15) Is that of a young lady who has called upon me while I have been writing these pages, to inform me that she is now perfectly well, has no cough, no difficulty in breathing, and during the last six months has gained many pounds in weight, so that she considers herself perfectly cured.

Her previous history is as follows:—

Miss S., seen by me in September, 1864, aged eighteen, complaining of pain in chest, weakness, emaciation, and much cough, with bloody expectoration. Slight dulness, with tubular uneven breathing at the apex of the left lung. Pulse 120, Tongue clean. Father and some of her sisters died of phthisis. She was ordered 5 grs. of hypophosphite of soda three times in the day, and sent to the sea-side, and in a month I heard she was better.

I have no further note till February, 1866, when I again saw this patient. The cough had returned with increase of hæmoptysis and expectoration, and the complaint of general languor and exhaustion was great (198).

Apex of left lung dull; respiration very harsh and jerking; right lung weak; heart palpitates much; pulse 100. She does not seem able to take cod-liver oil, and after giving her directions for diet, rest, exercise, and so forth, I bade her get a bottle of the pills of hypophosphite of quinine, as prepared by Swann, of Paris, and take one pill three times in the day. The consequence of this treatment was a steady, progressive amendment in every respect, and the last note made of this case is that with which this report begins.

This, therefore, may be regarded as a cases of phthisis (a disease hereditary in the family) in its early stage, attended with much exhaustion of force, hæmoptysis, and congestion of the lung apex, just the state in which hypophosphite of quinine promises well, and here after several bottles of the pills have been taken, at intervals, the cure was perfect.

In the next case the lung disease was much more advanced.

CASE CXVII.

(16) Mrs. M., had spent much of her life in India, and, when seen by me in October, 1865, was the mother of a small

baby of ten months old. She was much emaciated and exhausted, with a pulse of 120; frequent diarrhœa; fever and sweating at night; constant cough, with purulent expectoration, often mixed with blood; abundant loose crepitation, audible all over the upper left front, and slightly too at the right acromial angle.

This patient took cod-liver oil and iodide of iron, with glycerine for two weeks, and at the end of that time was worse, so that we were glad to have the opinion of Dr. Williams upon the case. At the consultation it was evident that a cavity had now formed in the left lung, and Dr. Williams gave it as his opinion that the case might be brought to a chronic state, and the patient live yet for some time; a sound prognosis as the event seems to prove. The remedies now employed consisted of tannin with phosphoric acid, cod-liver oil, and a morphia pill at night, and in the after-treatment of the case I caused the patient now and then to change the phosphoric acid mixture for pills of hypophosphite of quinine (Swann's). This I did with the more confidence, as I found on inquiry, that Dr. Williams himself approved of, and used, the hypophosphites in certain cases (489).

The result of this mixed treatment, and of two winter's passed at St. Leonard's, was such that at the present time this patient is so well, that she is on her way back to India, having, as it seems to me, a dry quiescent cavity in her left lung, and fair breathing in her right.

This, therefore, was a case of phthisis in its third stage, and at times, things were very unpromising, as the detailed notes can prove; the disease seemed, however, to be perfectly arrested by peculiarly good climatic influences, phosphoric acid, hypophosphite of quinine, and a prolonged course of Möller's cod-liver oil.

Here is a case in which a cavity had formed in the lung.

CASE CXVIII.

(17). Eliza H., aged seven; seen in June, 1867; a pale, weak child; ill for a long time with cough and expectoration, very thin, and has profuse night sweats. On examination of the chest, the breathing is noted as weak in the right lung, while in the upper part of the left there is a cavernous breathing, pectoriloquy, and some moist gurgling sounds, showing that there is a cavity in this left lung.

The child has never been able to take cod-liver oil. Under these circumstances she was ordered the hypophosphite of lime, with glycerine in water, and in three weeks had mended considerably, the cough was less, and the cavity seemed to get drier.

After three weeks, as she looked very pale, she had some of the syrup of iodide of iron, and after six weeks of treatment, she was let go with good breathing in the right lung, and with the cavity in the left in a quiescent state, though still there was some cough and expectoration in the morning.

This case resembles that of William P., Case CX. In both cases the hypophosphite of lime seemed to arrest the progress of the disease in the lungs; in the case just reported, a course of iron followed the hypophosphite with advantage, while, in the other case, iron with calumba certainly did harm and interrupted the cure.

Case CXIX.

(18) Illustrates well the effect of the hypophosphite of lime in checking the progress of consumption, even when it had reached an advanced stage:—

Charles H., aged eighteen, an engine-cleaner, was taken ill in January, 1867, with severe cough, and frequent attacks of rather free hæmoptysis, strength rapidly declined, and, on February 4, he was assisted by two friends into the room to be examined for admission as an in-patient of Victoria Park Hospital.

His look was markedly phthisical, with hectic flush on cheeks; eyes dark and clear; weakness extreme; much loose large crepitation heard all over upper part of left lung; some crackling sounds also in right chest.

He was not deemed a fit case to be taken into the hospital; he had, indeed, every sign of having steadily advanced to the last stage of phthisis; night sweats were troublesome: he had no appetite, and it *was satisfactory to hear that he got back home alive.*

The only medicine ordered for him was five grains of the hypophosphite of lime, in mint water, three times a day. From the time he commenced this medicine, improvement set in, so that in the summer he was able to go into the country, taking at that time cod-liver oil and quinine.

August 12, 1867.—He came to show himself on his return from the country previous to returning to his work. He has no cough at all; appetite good; strength and flesh returned; chest flattened; percussion dullish; respiration harsh, with prolonged expiration; at bases, respiration and percussion good. His only complaint is of severe lumbar pain, for which he was ordered an emplastrum ferri; he was further advised to continue his cod-liver oil, and he went back to his rather laborious work.

October 28.—He was seen, and, to all appearance, was quite well.

January, 1868.—As I feared, there is a return of cough, but nothing more than harsh breathing can be detected in the chest. Ordered to take six grains of hypophosphite of soda three times in the day.

After taking this medicine for one fortnight, I learned that his cough had ceased, and that he had returned to work in good health.

CASE CXX.

(19) Affords another instance of the arrest of advanced phthisis; the ultimately fatal result was due to the patient's imprudence (225).

C. W., a well-grown man, aged thirty-four, of healthy parentage, came to me on June 14, 1866, evidently in a far advanced stage of pulmonary disease. His history was as follows:—

Fourteen months ago, having previously been in good health, he began to cough and spit blood freely; he lost flesh fast, and though treated by a well-known physician, his disease continued in unabated force, and when I examined his chest, the right side was quite dull, breathing quite cavernous, with gurgling and tinkling noises intermixed. On the left side there was some moist crackling about the apex. Pulse 120. Much thick expectoration and heavy damp sweats day and night. Feels very weak.

Ordered five gr. sodæ hypophos: c. five gr. sodæ carb: in water, three times daily.

June 21.—Much better; eats better; less spitting; pulse 120.

28.—℞ Pil. morph. one-sixth gr. every night, as he does not sleep well.

By the end of August he seemed very much better; there had been one or two slight returns of hæmoptysis, but the expectoration was much less, and the gurgling noises over the right chest were replaced by dry creaking sounds, with hollow cavernous breathing, and great dulness on percussion.

He was ordered to take cod-liver oil with some tr. ferri, and he went on well till the end of October, when he went to spend the winter at Bournemouth. For some time I heard nothing of him, but in the following spring in answer to inquiry, I learned that before he left London, as he felt so much better, he got married, and rode all the way to Bournemouth with his face to a cold wind, stating in answer to the urgent remonstrance of his wife, that the air would do him good.

In this he was quite wrong, for he got a bad attack of bronchitis, which caused his death just one month after his marriage.

'I might detail three or *four more cases of patients now under observation, with unmistakable cavities in the lung*, and yet who hold their ground well (155), with the help of drachm doses of the syrup of hypophosphite of lime, and, at times, for a change, cod-liver oil, and tr. ferri.

'These cases were all, so far as I could judge, free from complication in the way of disease of the liver, kidneys, or larynx; the absence of such complications, I find to be a very great point in judging of the probability of arresting the lung disease.

'I now take from my note-books some more cases to illustrate the effect of the hypophosphites in the earlier stages of consumption.'

CASE CXXI.

(20) Wm. G., aged forty, lives in Essex, seen on July 30, 1866. Has had cough and hæmoptysis for sixteen weeks, with loss of flesh and strength.

Left upper chest dullish, with some crackling sounds. Right is not clear on percussion, and breath sounds very feeble. Ordered five grains of hypophosphite of soda three times a-day in infus. calumbæ. From this medicine he derived much benefit, but in August, as he complained of exhausting night sweats, it was changed to the hypophosphite of lime.

September 24.—Let go much amended; has gained in flesh and strength, still has some cough, with yellow expectoration, and respiratory sounds are feeble in both lungs.

December 3, 1866.—A bad relapse. Cracklings distinct at upper left chest, much thick spit. He was now ordered cod-liver oil as well as the hypophosphite of lime, and by December 31 he felt himself quite well again; 'nothing near so much cough and spit,' no more hæmoptysis; pulse 72; appetite good.

He went on very well for two months, and then the cough returned with free expectoration. *This time I gave him the liquor calcis saccharat. of the B.P. in half drachm doses, to see if its effect was the same as that of the hypophosphite of lime, but even though he had cod-liver oil, he got no relief till five grains of hypophosphite of lime were added to this mixture;* then he improved, and is at the present time in very fair health.

Case CXXII.

(21) Benjamin B., aged eight years. A short time ago this boy's father died of phthisis; the boy himself has been long troubled with cough, and has been refused admission into an orphan home, as the examining physician reported both his lungs to be unsound. In consequence of this report his mother brought him to Victoria Park Hospital in the spring of the present year. He is very pale, and losing flesh fast, while on both sides of the chest crepitating râles are heard below the clavicles.

Ordered three grains of hypophosphite of lime, with ten drops of the liq. calc. sacc. B.P. in water three times daily.

Gradually this boy regained flesh, the râles vanished entirely from his breathing; in a short time he was able to take cod-liver oil, and in two months was dismissed perfectly well, and has remained so ever since.

Case CXXIII.

(22) About the same time that this boy was under treat-

ment, a patient came to me who, in the year 1864, was for a long time under my care for cough, with purulent expectoration and frequent hæmoptysis, moist cracklings being audible in the left lung. Various remedies were tried to no purpose. At last, under the influence of the hypophosphite of soda in camphor water, all these symptoms grew much better, and the young man at once ceased further attendance, having apparently an aversion to doctors and physic. I judged he would soon have a relapse, and probably die, but early in the year 1867 he came before me, bringing a young relative for whom he wished me to prescribe, and I was able then to certify to myself, and a friend who was with me, that the cure had been both perfect and permanent; the youth told me he had strictly followed my advice to be much out of doors, had joined the volunteers, and had been all through the fatigues of the Brighton review, feeling all the better for it.

Cases CXXIV., CXXV., CXXVI.

(23, 24, 25) In three, somewhat similar, cases occurring among young men, the symptoms being cough, emaciation, hæmoptysis, and irregular breathing, with some little crackling at the lung apex, the hypophosphite of soda was given in camphor water, and rest from work enjoined for a few weeks. Two of the patients were able to return to work, and have continued well; the third, whom I have had now for three years under observation, got well at first so fast, that he himself said, 'I did not think I could have improved so fast in so short a time;' yet still there was very distinct crackling in the right chest, and recently signs of a small cavity have appeared, so that I have been obliged to make this patient leave London to pass the winter at St. Leonard's.

Case CXXVII.

(26) James R., seen May 9, 1867. Pale, thin man, losing flesh rather fast, much cough, and now and then hæmoptysis. Left lung full of moist crackling; pulse 104, no fever; cold sweats at night. Cannot take cod-liver oil, as it always sickens him.

Ordered five grains of hypophosphite of soda, in camphor water, three times daily.

He gradually improved, and the moist crackling in the left lung was, by degrees, replaced by a dry creaking sound; at the same time the cough got better, and he did not spit 'nothing near so much' as formerly.

He was soon able to begin cod-liver oil, and eventually left to go to his home in Wales, feeling himself quite well.

CASE CXXVIII.

(27) Elizabeth D., aged thirty-five, living at Poplar; she has been under treatment for about one month for free hæmoptysis and cough, exhaustion, and much tightness and oppression at the chest, with substernal and inter-scapular pain.

Percussion note is fair; breathing very feeble at both infra-clavicular regions, and under the right clavicle clicking sounds are evident.

The medicines that have been hitherto employed have been opiates, tonics, and cough mixtures, but the disease appears in no way influenced by them; indeed, the patient is conscious of feeling worse than when she first came under my treatment.

She now had five grains of hypophosphite of soda, in camphor water, three times a-day, and one teaspoonful of cod-liver oil after meals. She continued this treatment for a month, and was then discharged with complete loss of all chest pain, scarcely any cough, not a trace of blood in the expectoration, and no morbid sounds to be heard in the chest.

This patient, while taking the hypophosphite, was able to digest and assimilate a small quantity of cod-liver oil, and I find it not uncommon for persons to be able to *digest the oil after a course of hypophosphite of soda*, whereas before they have been perfectly unable to retain it on the stomach (489).

CASE CXXIX.

(28) M. V., a shoemaker, aged twenty-five. In July, 1862, this man states that he was an in-patient of Victoria Park Hospital, and was then set down as in the second stage of phthisis. He was under the care of Dr. Peacock, and improved greatly during his stay in the hospital, gaining much, both in weight and strength, and leaving very greatly improved. His weight on leaving was 7 st. 2 lbs.

December, 1862, he had to become an out-patient under Dr. Ingram, and the note recorded softening going on in the upper part of the left lung, no hæmoptysis. He was treated with cod-liver oil, quinine, and steel, and got somewhat better.

October 16, 1865.—I saw him for the first time, he had then much thick yellow expectoration, and abundant loose crepitation, audible all over the upper half of the left lung; clicking sounds are heard also over the right lung.

He now got five grains hypophosphite of soda in camphor water as his only medicine, and began at once to amend; after a few weeks he had ʒ ij. of oil three times a-day, and on January 29, 1866, he remarks that his weight is now 8 st. 5 lbs. The expectoration from being thick and yellow, is now described as diminished in quantity, and of a watery nature. The left chest is dull and flattened, a few moist crackling noises are heard, with very weak breathing. The breathing in the right lung is weak, but free from any abnormal sound.

This man has remained since in very good health.

'It was noted here, how, as the man got better, the thick yellow copious expectoration became smaller in quantity, and changed in quality to what was described as a thin, watery, scanty spit. Precisely the same change was noted in the case of C. W. (Case CXX.)'

'Another point noted was the feebleness of the respiratory murmur in the lungs as they got free of crackling and gurgling noises. In several cases of well-marked arrest of rather advanced phthisis, I have observed this great weakness of the breathing, and I believe it is due to a large number of the air-cells being obliterated in the process of healing that goes on in the lung, for, coincidently with this change in the sound of the respiration, I have observed flattening of the chest wall, and some impairment of resonance in the percussion note.'

'If, by any chance, these cases of arrested phthisis contract an attack of acute bronchitis or pneumonia, the danger of a fatal result is very great (225, 166, 167), and after death a good deal of fibrous tissue is found in the lung, though, *possibly, there may be but small signs found of real tubercle remaining in the lungs'* (153, 154).

CASE CXXX.

(29) This case was a good one to test the powers of the hypophosphite of soda.

Henry G., a thin, pale man, with crackling sounds in the respiration over the left chest, much cough, and thick expectoration, with emaciation; got five grains of hypophosphite of soda in camphor water on April 15, 1867.

On the 29th he declared himself quite free from cough and spitting, his chest is sore, and he remarks that what he has been taking 'seems a very wonderful medicine.'

Ordered to continue the medicine, and take ʒ ij. of cod-liver oil three times daily.

June 1.—Let go cured; respiration good on both sides of chest.

July.—Return of cough, very prolonged expiration at left apex, much substernal soreness.

This time he was ordered vin. ipecac. c. tr. opii. c. potass. nitrat.; the result noted was increase of cough and spitting; a change to the hypophosphite of soda soon put him right, and he returned to work.

December, 1867.—He again fell ill with return of cough and shortness of breath; this time I gave him the bicarbonate of soda, but he did not find this to relieve the chest, and remove the expectoration, so that I had to order the hypophosphite again, and he is amending gradually upon it.

CASE CXXXI.

(30) Joseph D., a thin, pale young man, with much cough, and frequent spitting of blood, which symptoms have troubled him about twelve months, came as a hospital patient on January 31, 1867.

Resonance of chest is fair, but expiration is prolonged under both clavicles, chiefly under right, and here a good deal of coarse mucous râle is heard. Pulse 114; tongue clean; has lost 20 lbs. weight in six weeks.

℞ Calc. hypophos. gr. v.
Liq. calc. sacc. ʒ ss.
Aq. Menth. pip. ℥ j. ♏ ter die.
Pil. conii. co. om. nocte.

February 14.—Feels much better; pulse 88; still some hæmoptysis. Pt. hst.

28.—Some sonorous râle on right side; still has cough, and at times hæmoptysis.

℞ Magnes. sulphat. ʒ ss.
Acid sulph. dil. ♏ x.
Infus. calumbæ. ℥ j. ♏ ter die.

March 7.—Worse; pulse 100; increase of the hæmoptysis; return to the hypophosphite. By the middle of April he was able to return to work, and has continued in very fair health up to present time, although the respiration in the right lung is not free from abnormal sounds. This man tried cod-liver oil, and also steel, but the only remedy that agreed well, and seemed really to check the progress of his disease, was the hypophosphite of lime.

CASE CXXXII.

(31) Esther R., widow, æt. thirty-nine, seen March 21, 1867. Pale and thin, though living in a healthy suburb, and well cared for. Complains of much cough and expectoration, with, at times, hæmoptysis. The left side of the chest is dull, and full of crackling noises, the right is resonant, and the breathing strong.

Ordered sodæ bicarb. c. sodæ hypophos. for two weeks, at the end of which time there was not the least improvement (92, 96).

℞ Acid. nitric. dilut. ♏ x.
Aq. camphor, ℥ j. ♏ ter die.

On this mixture she amended considerably: she took it for a month with relief to her symptoms.

In May, after a short interval of rest from physic, the cough, expectoration, and exhaustion, seemed worse than ever, and we again made trial of the hypophosphite of soda. At this time, too, the catamenia had stopped, the cough caused her to vomit her food; the left chest was very tender, and full of moist crackling.

Curious to say, this time the hypophosphite answered well; the vomiting ceased; the respiration became more natural in the left lung, and in six weeks' time she was pronounced convalescent, having taken for the last fortnight some small doses of iron, but no cod-liver oil, as this did not agree with the stomach.

In July the catamenia returned naturally.

In October there was a return of the symptoms, and she had, for a time, carbonate of ammonia with infus. serpentariæ. On this medicine the disease evidently gained ground, but on returning to the hypophosphite of soda, the symptoms changed for the better in a way that elicited her very warmest praises, especially she noticed the breathing to get so much more free and easy while taking the hypophosphite with some ether in camphor water. The cracklings in the left lung were replaced, to some extent, by proper respiration, and for a time, she continued in very fair health.

CASES CXXXIII. AND CXXXIV.

(32, 33) In two other cases of men who had moist cracklings with the respiration at one apex, the breathing improved much under the use of the hypophosphite. One of these patients had been some few years before pronounced to be consumptive by Sir J. Simpson, and at that time found great benefit from inunction of oil to the chest. The arrest of the disease did not seem, however, to be so complete and lasting as it was under the influence of the hypophosphite of soda.

'In some few instances of consolidation of lung from exudation, I have used the hypophosphite of potash with great success, as will be seen by looking over the two following cases' (101):—

CASE CXXXV.

(34) Susan N., living in a marshy part of Kent, aged thirty-five, seen January 28, 1867.

About two months ago she was laid up with bronchitis; the acute attack yielded to treatment, but there remains now a troublesome cough, with a thick, very fœtid expectoration, and great tightness and oppression at the chest.

The voice has become so feeble as to be scarce heard. She rests pretty well at night; tongue coated slightly, with a furrow down its centre.

Respiration very harsh—at left lung apex it is tubular.

Ordered—Hypophosphite of potash, gr. v. ex. aq. camph., t. d.

July 4.—Very much better. Continue medicine.

18.—Been without the medicine for a week, and during that time the cough returned with nasty fœtid expectoration, not so while taking the medicine. Resume mixture as before.

By the end of March she was put upon a tonic mixture, and dismissed cured.

Case CXXXVI.

(35) Another case was that of a gentleman, who I attended twelve months ago, with Dr. Lawrence, of Wandsworth, for a severe attack of left pleuro-pneumonia. The consolidation of lung was very obstinate, but at last resolved itself in a most satisfactory way, under the influence of three gr. of hypophosphite of potash, taken three times a day for some weeks.

In this case the medicine at first caused some increase of cough and expectoration; this is, in my experience, a very usual occurrence, and, provided this augmentation of the expectoration does not cause undue exhaustion, it need not cause anxiety.

The following cases are given by Dr. Thorowgood on the use of the hypophosphites in laryngeal phthisis:—

Cases CXXXVII. and CXXXVIII.

(36, 37) In cases of that very intractable disease laryngeal phthisis, I must confess I have not found satisfactory curative effects from the use of the hypophosphites. Some four years ago I had a young lady under my care with cough, hæmoptysis, and signs of incipient phthisis at the left apex. Under the use of the hypophosphite of soda every morbid sign vanished in about two months, and she has since remained in good health. Her sister, on the contrary, has every sign of progressive laryngeal phthisis, with complete extinction of the voice, cough, and wasting, and no form of the hypophosphite, or indeed of anything else that has been tried, has done her any good. In the winter of 1866 the symptoms were not advanced, and an examination with the laryngoscope did not show any ulceration of the larynx. She went, by my advice, to Bournemouth; while there her voice returned, and she came back very much better. The improvement only lasted during the summer. With the cold weather the laryngeal symptoms returned in an aggravated form, and she has been obliged to take refuge on the coast of South Devon.

From what I gather in perusing the reports of cases of laryngeal phthisis treated by Dr. Churchill it seems that the aid of various other methods of treatment, local and general, has here to be invoked in addition to the use of the hypophosphites (80, 507, Appendix IV.).

With regard to the important question as to the permanency of the results obtained by the use of the hypophosphites (166—169), Dr. Thorowgood says:—

'From what I have seen of patients whom I have treated three or four years ago by means of the hypophosphites, the permanency of the cures has, in numerous instances, been so remarkable that I have doubted as to whether I had correctly noted the symptoms manifested by the patient, when actually under treatment, and have questioned them as to their own recollection of the symptoms (153, 236). I can call to mind only one of those cases given in detail that has to my certain knowledge relapsed, although I have in numerous instances urged the patients to come to me at once should any signs of returning disease appear.'

531. The following case showing the value of the hypophosphites in pregnancy (127, 240, 341) is given by Dr. W. H. Sterling, of Burlington, N.J., in the 'American Journal of the Medical Sciences,' January, 1869:—

Case CXXXIX.

A lady under my care in her first pregnancy suffered most severely from toothache and facial neuralgia, consequent upon the rapid decay of her teeth, which had previous to this event been very good, been kept with scrupulous care, and had not for years required any attention from the dentist, until about the fourth month of pregnancy, when they began to decay with great rapidity, so that in the course of a month seven were sufficiently decayed to need filling, and the neuralgic pain attendant upon their condition was such as seriously to affect her health.

The ordinary remedies having been used but with momentary relief, it occurred to me, as her organization was highly nervous, and nature, with wise provision, ever takes care to supply the fœtus with proper and ample nutrition, even at the expense of the mother, that perhaps the bone and nerve-forming elements in her system were not sufficient to meet the wants of both mother and child, and hence the failure to provide for the molecular changes in the teeth, the material being used for the bony structure of the rapidly growing fœtus. Acting upon this theory, I prescribed the hypophosphites of lime, soda, and potassa, together with the hypophosphite of manganese (having previously given iron), in two grain doses each three times daily. The relief was immediate and permanent, the pain entirely removed, the decay of her teeth was arrested, and her general health has very much improved with the renewal of her physical strength and mental vigour (123, 127).—'Half-yearly Abstract of the Medical Sciences,' vol. xlix., 1869, p. 158.

532. The reader has already been enlightened as to the real value of Australia as a resort for the consumptive, and before reading the following extracts from Dr. Bird's report, he will do well to refer to what has been said previously (437), where he will see that the climate of Australia is completely powerless to arrest or modify consumption, unless the patients, like those of Dr. Bird, take the hypophosphites.

In the 'Lancet,' January 5, 1867, p. 6, Dr. Bird published a statement from which the following is an extract:

'The forty-seven cases noted were all persons in the middle and upper classes, upon whom no specially prejudicial influence was operating, and who lived here under pretty much the same conditions as in England,

and will, therefore, give a fair and impartial view of the question in point. Of these it will be seen that twenty-two arrived here in the third stage of phthisis, cavity already existing. Their histories are as follows:— One died a few weeks after landing from pneumonia; he had old disease of the liver and albuminous urine. Seven have benefited little, if at all, by the change, the disease following its usual course. Five have gained flesh, and are improving steadily. Eight have been restored to a more or less perfect condition of health, and are now following their ordinary avocations in this country, or have sailed for England fit for all the duties and pleasures of life. Twenty-four left England in the first or second stage of phthisis: two of them died, one from old asthma and heart disease, the other from repeated attacks of hæmorrhage and pneumonia, ending in acute phthisis, the result of imprudence and exposure; two have advanced to the third stage, unchecked by treatment, and the remaining twenty have been restored to more or less perfect health, either by the voyage or by a subsequent residence in these colonies. It would be tedious to detail each case.'

CASE CXL.

(1) Mr. A., professional, aged forty-two. Arrived February 1865. Emaciation and night sweats excessive; large cavity in upper left lobe; smaller one in right lobe; much scattered softening tubercle. Stomach very irritable; cough and dyspnœa excessive. Has lost weight progressively from commencement of illness, two years before, till arrival in Melbourne. When he consulted me I regarded the case as almost hopeless. I gave him cod-liver oil *and hypophosphites*, which he had previously taken in England without benefit (87, 470 B, 539, 535, and Cases CXXXI., CXLVII.). He has continued to improve up to the present time (August, 1866). The cavity has shrunk and dried so much as to be hardly perceptible by the stethoscope; on the right side no morbid sounds are audible, beyond slight dulness and prolonged expiratory murmur. He has a hearty appetite,

digests all kinds of food, gains steadily though slowly in weight; sleeps soundly all night on either side, coughs and spits comparatively little. He has taken an office and resumed business, and often walks into town in the morning (four miles) from his suburban residence. He went northwards during July and August of last winter, but this year has not found it necessary to move.

I may simply remark that at that time the hypophosphites had not been pirated or counterfeited in Australia as they have been since, and as they already were in England (87—93).

CASE CXLI.

(2) Mr. F., draper, aged twenty. Of well-marked phthisical aspect, but has no family history of the disease. He has been ill eighteen months. Arrived November, 1863. Considerably emaciated; pulse 120; expectoration profuse and nummular, nervous debility, with constant frontal headache and disgust of food. Did not improve on the voyage.

Physical signs.—Marked dulness in left upper lobe, with bronchial breathing and occasional loose râles; gurgling and pectoriloquy distinct in left supra-spinous fossa; right upper lobe breath sounds very feeble, with dulness; lower lobes normal.

After taking *hypophosphite of potash* and bitters, with cod-liver oil and occasional alteratives for a few weeks, he was so much improved that I sent him up the country to reside on a friend's station, and lost knowledge of him for some months. In December 1864, he called on me, but I did not at first recognise him; he had become ruddy and stout, and was in excellent health. On examining his chest I found that all distinctive morbid sounds had disappeared. He sailed for Scotland the following day to resume his business.

CASE CXLII.

(3) Mr. H., aged thirty. Family history good. Spat blood in March 1863, when clerk in a bank in London. Phthisical

symptoms followed in ordinary course. Arrived in Melbourne, February 1865.

Physical signs.—Dulness in left sub-clavian, with moist tubercular click, audible also behind; left lung pretty healthy. Has lost about a stone and a half in weight. Improved slightly on the voyage.

In April he commenced bank work in Melbourne, which was followed by increased cough and expectoration, with night sweats. To take cod-liver oil with *hypophosphites*. Band of gutta-percha seton introduced under left clavicle.

April 15.—Much improved; gaining flesh; cough and expectoration ceased; feels better and stronger than at any time since the commencement of his illness.

July 19.—Seton has cut itself out; another introduced; still gaining weight, and in excellent spirits; no morbid sounds audible beyond slight dulness.

September 12.—Seton came away.

November 10.—Symptoms disposed to return; has spat a little blood; another seton introduced.

January 3, 1866.—In very good health in spite of very severe work, his bank being short-handed; appetite excellent; weight about stationary.

March 10.—Seton came away.

August 1.—Has remained well in spite of being terribly over-worked, but has lost flesh since the seton came away; takes cod-liver oil and *hypophosphites* for two or three weeks at a time with intervals; chest symptoms quiet; should they recur he will come at once for another seton, feeling the relief it gives him. This is a very instructive case. The patient has been living in Melbourne in the same conditions, exaggerated, under which the tuberculous diathesis was introduced in London. Had his lot been cast in a country district inland, with open-air employment, I have little doubt that restoration to perfect health would have resulted from the first few months of residence in Australia. As it is, I have every hope that (even with his disadvantageous employment) the lung mischief may be quieted and staved off by judicious counter-irritation till his naturally good constitution has outgrown its tuberculous tendencies. No temporary counter-irritant, such as blisters, iodine, or croton oil, would have produced the permanent good effect of the seton. The smooth gutta-percha band is almost painless after the first couple of days, and so far from weakening the patient (in properly selected cases) he usually, as in this case, steadily gains in weight and strength when it is in, and loses when it comes away. That the habit can be overcome as the need for it diminishes is seen from the increased interval of immunity from chest symptoms between each successive seton.

As may be seen by the accompanying cases reported by other physicians, all the permanent benefit attributed by Dr. Bird to the seton was obtained by them with the hypophosphites alone, and no seton at all.

533. While this work has been going through the press, I have received copies of a second edition of Dr. Fedeli's translation of my French work ('Recueil de Documens,' &c.) which I have already mentioned (486 A). It contains reports of cases observed since 1867, either by Dr. Fedeli himself or by other Italian physicians, which will be found translated in what follows. Had I been met by the profession in England in the same spirit of generous courtesy as I have been before, and should have again been, in Italy or in any other civilized community, I should very likely never have been able to bring myself to take the resolution I have come to with regard to my new inhalants (509). On the whole, however, it is better, perhaps, that things should be as they are. The accidental circumstance of my coming back to England has opened up a wider issue than the solution of any medical problem, however important, and the battle must now be fought out upon the ground of *the absolute indefeasible right which the brain-worker has to the produce of his intellect, as much as the hand-worker has to the produce of his hands.*

533 A. Dr. Fedeli has done good work in collecting and publishing these results of the experience of his medical fellow-countrymen. As the use of the hypophos-

phites spreads in Italy, as their properties come to be better understood, and as the necessity of administering them *scientifically* becomes more evident, the Italians themselves will be the greatest gainers, but besides that, the vast number of foreign consumptives who resort thither, each winter, will be more likely to meet with medical advisers armed with all the best resources of science, and will thus be enabled to derive the greatest possible amount of benefit from a favourable and beautiful climate. Those who have already been using the hypophosphites at home will be able to continue them under the advice of physicians already experienced in their use, and those who have not will thus be more likely perhaps to get them before it is too late.

In what follows several points are perhaps open to discussion, but the general tenor is so strikingly confirmative of my own views that when there is an occasional difference, I have thought it sufficient, in all cases but one (539), merely to refer the reader to the views and facts already given:

> Ubi plura nitent . . . . non ego paucis
> Offendar maculis, quas aut incuria fudit,
> Aut humana parum cavit natura.

The present practice of therapeutical observation (234, 468, 484) is so very unsatisfactory and unscientific, that the only wonder is that, in so complex a question, there should be so much agreement between different and so widely separated observers unknown to one another.

Dr. Fedeli says:—

'In the first edition of this translation I had said that every physician ought to contribute his help, however modest, to the structure Dr. Churchill is engaged in raising, and state as far as his own observation goes, what is the result obtained by the use of Dr. Churchill's discovery in the treatment of phthisis. I now give the results of their experience in the use of the hypophosphites which have been communicated to me by several of my professional brethren, as well as some cases observed by myself.

534. 'Dr. Matteo Lanzi, Physician-in-Chief to the hospitals in Rome, has given an account of five cases, four of them in an advanced stage, and all treated by Dr. Churchill's hypophosphites.'

Case CXLIII.

(1) A lady of thirty-five, of scrofulous constitution and with an hereditary predisposition to consumption, was found on examination to have crude tubercles at the top of both lungs. She took the hypophosphite of lime for forty days. The general condition, such as strength, etc., gradually improved, as did the signs of the disease. At the end of that time she was to all appearance cured, and I ceased to see her after impressing upon her the necessity of continuing to take the hypophosphites for some time longer.

Case CXLIV.

(2) A man aged thirty, of weak constitution, who had had much sorrow, showed the signs of softening tubercles at the apex of the left lung, with decrease of vesicular murmur in the right; fever at night; loss of flesh and appetite, etc. After taking the hypophosphites for a few days improvement set in and went on gradually until at the end of a month he was able to go out. I then ceased to visit him, but met him some time after and was told he was quite well, which was confirmed by his healthy looks.

Case CXLV.

(3) Another man, aged twenty-seven, showing the rational and diagnostic signs of a cavity in the right lung, took the hypophosphite of iron for fifty days with such improvement that the fever and the other symptoms of the disease disappeared, and he was able to return to his native place, on the shores of the Adriatic.

Cases CXLVI. and CXLVII.

(4, 5) In two other cases, those of two ladies, one unmarried, the other married but without children, both about twenty, of weak, languid, delicate, and consumptive constitution, the hectic fever and other symptoms of the disease were in full progress, with signs of a large cavity in the lungs. Both were placed under treatment with the hypophosphite of iron, but with only temporary advantage and both died (109, 208).

535. ‘ Dr. Cesare Fabbri's observations made at Monte Marcio are very interesting, as showing the importance of using none but Dr. Churchill's *genuine* hypophosphites’ (87).

CASES CXLVIII., CXLIX., CL., CLI.

A youth of sixteen, of nervous and lymphatic temperament, fell ill after a fall; was attacked with cough and spitting of blood; remained for two months in this condition, and when reduced to the last extremity consulted Dr. Fabbri. The rational as well as the physical signs of auscultation and percussion left no doubt of the tubercular nature of the complaint. He was ordered the hypophosphite of lime, and took what was prepared in the country, but without any result. Seeing this Dr. Fabbri prescribed Swann's preparations. In two months' time he was restored to perfect health, and remained in this condition for more than a year, after which he again fell ill, in consequence of irregular living. He was again ordered the hypophosphite, but not being able to obtain the genuine preparation, no effect was produced, and after some months' suffering he died. The same result followed in two other cases, which were treated by means of the hypophosphite of lime and soda prepared by chemists of the locality; while in the case of a young girl who was suffering from chloro-anæmia the use of the *genuine* hypophosphite of iron produced a complete recovery in about two months.

536. ‘ Dr. Tommaso Panegrossi states that in cases of well-ascertained phthisis he has seen, wherever the tubercular deposit was limited, a marked improvement, and an arrest of the disease for many months’ (165, 166, 167, 169).

CASE CLII.

(1) Dr. Panegrossi mentions one case in the third stage, that of a young girl of twenty, where there was a cavity at the apex

of the right lung. It terminated in complete recovery, and she is now in perfect health (64).

Case CLIII.

(2) Dr. Panegrossi mentions another case still under treatment, that of a lady who has now been living for four years in a comfortable state of health, although nothing remains of the left lung but the upper lobe, which is adherent to the pleura. The lower lobe is destroyed and atrophied, and there is a sinking in of the ribs on that side. From time to time there is fever and increased suppuration, but for months together she remains in comfortable health. She takes the hypophosphite of lime. Dr. Panegrossi adds :—'It must be admitted that up to the present time from no treatment but Churchill's can we hope to obtain such results as this.'

537. Dr. Filippo Cerasi, editor of the Roman medical journal 'Archivio di Medicina.'

Cases CLIV., CLV., CLVI., CLVII.

In his private practice, Dr. Cerasi prescribed the hypophosphite of lime to three patients suffering from chronic bronchitis, who were all cured after somewhat more than a months' treatment (241).

In another case of chronic bronchorrhœa there was an improvement at the end of the first week, and in a month the patient was completely well. Dr. Churchill's hypophosphites, prepared by Swann, were used in all these cases.

538. Dr. Luigi Gualdi, Physician to the hospitals, cannot say that he has obtained anything more than a temporary improvement among the poor whom he has treated in the hospital, but *he has never been able to make use of Swann's preparations* (87—112, 535).

539. Dr. Todini, in reply to Dr. Fedeli's enquiries, 'stated that he had used Swann's preparations in several cases of pulmonary phthisis without any favourable result.' Dr. Fedeli gives no other details. Before the reader concludes that this is proof of *negative results*, he will do

well to refer to what has been said (99, 460, 460A) about negative results in therapeutics, and to the very striking case which I have reported from my own practice (470B), and to Case CXLVIII. In the instance that occurred to myself, I had given the patient a prescription bearing the indication of *my own* hypophosphites, prepared by Swann, and directed to the chemist who usually supplies my patients. The patient had already been to him with other prescriptions of mine, so that I had every reason to suppose that he would go there again, and to conclude that all the time he was not improving, contrary to my anticipations, he was nevertheless using my own hypophosphites. Had I been called upon, at that moment, for my testimony, I should undoubtedly have been compelled to declare that in this case the hypophosphite had failed. The reader has seen that this conclusion would have been a wrong one, because the patient had gone to another chemist, and had not taken Swann's preparations at all. Now, is it not possible that in the case of Dr. Todini's patients the very same thing may have occurred? I am convinced that all who have had experience of the action of the *genuine* hypophosphites will join me in saying that it is not only possible but highly probable. Although their curative power may vary with the conditions of the case, as was fully explained before (156), their *therapeutic* action (136) is as constant and as manifest as that of opium or alcohol.

The very fact of *none* of Dr. Todini's patients having improved, only increases this probability, as that would be just what might happen if they all got their syrups from the same druggist. I have dwelt thus at length upon this fact on account of its importance (471) to patients, and because the case of my own patient shows that in any scientific process the enquirer must take no fact upon trust. More particularly if he arrives at a negative conclusion where others have obtained positive results, is it incumbent upon him to test, by every possible means, the validity and certainty of every one of the steps he has gone through, and it is only after such complete contradictory verification that he may safely draw his inferences therefrom. As our great didactic poet has finely said—

> From Nature's chain whatever link you strike,
> Tenth or ten-thousandth breaks the chain alike.

540. Dr. Alessandro Ascenzi treated eight cases of phthisis with Swann's preparations. Of these eight cases two experienced no improvement; in one it was only temporary, in three it was more permanent, and two completely recovered.

'With the hypophosphites,' says Dr. Ascenzi, 'there is almost always a decrease of cough, fever and night sweats, an increase of strength and appetite, with a feeling of comfort which impresses both the patient and the physician.'

541. Dr. Lieto Regnoli, Physician-in-Chief to the Hospitals, writes to Dr. Fedeli as follows:—'For several years past I have adopted in my private practice, for the treatment of pulmonary tuberculosis, Dr. Churchill's hypophosphites, prepared by Swann, of Paris, and I have endeavoured scrupulously to carry out his indications. I have treated in all *twenty-one* cases in different stages of the complaint. Of these *seven*, in an advanced state, died; nine, *who were in the conditions of curability* indicated by Dr. Churchill, were cured; the other five were very much improved (160). Among those who recovered, I was much struck by the following:—'

Case CLVIII.

(1) A girl of eighteen had come to Rome from the country, with all the symptoms of advanced phthisis in the second stage. There was extreme emaciation, loss of appetite, cheeks highly coloured, loss of voice, burning heat, fever in the evening, pro-

fuse perspiration in the morning, troublesome cough, with thick purulent expectoration, menstruation suppressed, etc. The use of the hypophosphites alone, for three months, was followed by complete recovery. On her leaving Rome, she was directed to continue the hypophosphites from time to time. Since then three years have gone by: she has married, has become a mother, and continues to enjoy good health.

CASE CLIX.

(2) A consumptive lady in the fourth month of her pregnancy, and suffering from consumption in the second and *third* stages, was cured of the complaint by the use of the hypophosphites, but independently of the recovery of the mother there was marked improvement in the constitution of the child as compared with those she had had before. This fact particularly struck me, and induced me to follow up the experiment (126, 127, 240, 246).

CASE CLX.

(3) Another lady who was not consumptive, but rachitical, who had previously had four scrofulous, rachitical children that had died in their infancy, was ordered, during her pregnancy, to take a table-spoonful of Swann's syrup daily. The result was that she gave birth to a well-formed, healthy boy, who was suckled by his mother and grew up so healthy and strong as to look as if he belonged neither to the mother nor any of the family. He died at four years old of croup. In another pregnancy the same lady was put under the same treatment. This child was also a fine healthy son. He was suckled by his mother, who took the hypophosphites from time to time. The boy is now in perfect health, and three years old.

'It is not only,' says Dr. Regnoli, 'in pulmonary tuberculosis that I have used the hypophosphites with advantage. I have cured several cases of paralysis, dependent upon deficient nervous power, in five or six months, by the exclusive use of the hypophosphites (127, 238). In cases of weakness, consequent upon exhaustion produced by excessive losses of blood or other humours of the system, in chlorosis and chloro-anæmia (239); in the long and dangerous convalescence which follows miliary fever or diphtheria (240) the reconstituting and hæmatogenic properties of the hypophosphites, especially that of iron, have been manifested with *sovereign* efficacy. Whenever in any adynamic state, or after previous disease, it has been necessary to restore the vital powers to their physiological condition, I have always found the hypophosphites speedily effective. *The rapidity and certainty of their action make these remedies of higher value than any other used in medicine* (127, 246, 331). But these results, this powerful action of the hypophosphites, can only be obtained if the physician is bold and experienced in the use of them, and gives them in proper doses, with intervals of suspension, according to circumstances.'

'I must add,' says Dr. Regnoli, 'that of all the different preparations of this remedy met with in commerce, the best is Swann's, of Paris, because *it has always answered my expectations.*'

542. Dr. Valentini, who had formerly been physician to the military hospital in Rome, told Dr. Fedeli that after reading the first edition of Churchill's book (Paris, 1858), he had prescribed the hypophosphites in different diseases of the chest. In many cases of chronic bronchitis, in patients with broken-down, scrofulous or lymphatic constitutions he had obtained *splendid* cures by means of the hypophosphites, chiefly that of lime. But in some few cases of pulmonary tuberculosis, although Swann's preparations were used, the results were rather unsatisfactory (470 B, 539).

543. Dr. Luigi Casati, Physician-in-Chief of the Hospital of Forli and Editor of the 'Raccoglitore Medico,' wrote to Dr. Fedeli some time ago that 'Dr. Churchill's hypophosphites, prepared by Swann, had been used in his hospital in cases of consumption with good results, and

that, in his private practice, he had cured several case the same means.' Since then he has again written tc Fedeli to say that other successful cases since obse had confirmed him in his first opinion 'that the h phosphite treatment is a most valuable means of obtai successful results in the treatment of consumption.'

544. Dr. Pio Blasi, Physician to the Roman Hosp and to the Children's Hospital, sent Dr. Fedeli the re of the following case:—

Case CLXI.

A young child, after an attack of measles, was found t consumptive. He was treated actively and perseveringly blisters, cod-liver oil, decoction of Iceland moss, etc., but w out any effect. He was then ordered to take Dr. Churcl hypophosphites in doses of twelve grains daily (196). *I few days* the little patient began to improve; the treatn was kept up for several months, but after a time the child a fell ill and died (166—169, 198, 198A).

545. Dr. Borromeo, the head of the medical staf the Roman railways, has often told Dr. Fedeli, since publication of his translation of Dr. Churchill's work, 't he had used Dr. Churchill's treatment in many cases consumption with *splendid results*, even in advanced ca Dr. Borromeo expressed his regret that press of busi had prevented his giving Dr. Fedeli the written repc which he had promised him.

546. Dr. Fiorelli relates the following case:—

Case CLXII.

A young lady of seventeen, of a delicate, lymphatic con tution, whose mother had had attacks of hæmoptysis, had b suffering from consumption for four months, as was found auscultating the chest. She complained of pains in the ch shortness of breath, a dry cough, loss of flesh, great weakn suppression of menstruation, and fever. On the twentieth after beginning the use of the hypophosphite of iron strength and colour began to return, all the symptoms of the disease gradually disappeared, in two months the menstruation returned, and in five she was able to leave for Sicily in good health, and nothing was left of the disease but an occasional slight cough.

547. Dr. Fedeli himself reports the twelve following cases :—

Case CLXIII.

(1) In 1867 a young man of eighteen had had attacks of intermittent fever from the effect of the malaria at Tivoli, which were treated, without success, by the ordinary means, and produced great impairment of the system. This was followed by cough, particularly during the attacks of fever, increasing weakness and emaciation, irregular breathing, etc. On examining the chest I found dulness in the upper and anterior region of the left side, with dry crepitus and decrease of respiratory murmur. He was ordered to take from two to eight pills of Dr. Churchill's hypophosphite of quinine, prepared by Swann, daily (107, 244). In the course of a few days the fever and other symptoms began to decrease. At the end of three weeks they altogether ceased; the patient had gained flesh and strength. In two months from the commencement of the treatment his recovery was complete, and since then until now (1874) he has kept in perfect health.

Case CLXIV.

(2) I was consulted in 1867 by a man of thirty, whom I found on examination to be suffering from diffused tubercular deposit throughout the upper part of both lungs, in an advanced state of softening. He was in a very exhausted state, owing to frequent and abundant hæmorrhage from the lungs, as well as to the treatment which he had followed. He was in this condition previous to my going to Paris and my visit to Dr. Churchill's dispensary (486 A), and on my return I found him in nearly the same condition, except that the disease had made further progress in the left lung. I immediately put him under the treatment of the hypophosphite of soda, which was gradually raised to three table-spoonfuls of the syrup daily. At the end of three weeks the improvement of the general health, as well

as of the cough, expectoration, breathlessness, and dig
functions was very strongly marked. The treatment wa
up for three months, with intervals of intermission accordi
circumstances, and was gradually left off. From that
until now (1874) he has continued in the enjoyment of
health, has resumed his service as a butler, and occasionally,
complains of cough produced by over-work, has recourse t
hypophosphite of soda, which is speedily followed by
effect.

Case CLXV.

(3) A widow lady of thirty, after mental suffering an
tigue, lost strength and appetite, and became subject to fre
attacks of hysteria. In this state, at the beginning of the
season, she was taken with dry cough, fever, and difficul
breathing. This was allowed to go on, for a long time, wit
any treatment, until, the cough having got worse as well a
other symptoms, and spitting of blood having come on, she
sulted Dr. Fedeli, who found the following symptoms: Sl
fever, cough with tubercular and bloody sputa, night sw
pain in chest, suppression of menstruation, increasing lo
flesh and appetite, shortness of breath. On percussion, dul
on both sides in sub-clavicular and scapular regions; on au
tation, increased action of heart, with exaggeration of se
beat; large and small moist râles in the same regions,
numerous on the left side and diffuse at base. The patient
ordered the hypophosphites of soda and quinine alterna
This treatment evidently produced a good effect; but at
end of a month it became necessary to leave it off for a t
on account of an increase of cough and slight spitting of bl
After a few days it was resumed again, and kept up until
plete recovery, three months after beginning the treat
She was ordered to take from time to time, and accordin
required, a spoonful of the syrup of hypophosphite of iron.
is now in the enjoyment of good health, with the exceptio
some slight hysteric symptoms.

Case CLXVI.

(4) Dr. Fedeli was asked to attend a young man of twe
two, in whose family several brothers and a sister had die

consumption. On examination the patient was found to be suffering from extensive tubercular deposit throughout both lungs in an advanced state of softening, and a cavity already formed; there were great shortness of breath, fever, night sweats, diarrhœa, continual cough, with abundant purulent and fœtid expectoration. His condition was such that Dr. Fedeli thought he would not be justified in holding out to his patient's friends the slightest hope of his recovery. He was, however, ordered to take a table-spoonful of syrup of hypophosphite of lime, night and morning. At the end of a fortnight there was noted a return of strength and appetite, with improvement in the breathing, cough, and expectoration. The improvement continued and progressively increased, and at the end of a month from the beginning of treatment the patient was able to *leave his bed*, and somewhat later to go out. As the warm weather had set in, he was advised to go to the hills and continue the use of the hypophosphites with cod-liver oil (218). This state of increasing, and to the physician unexpected, improvement continued during the spring, summer, and a great part of the autumn, and was so well kept up that his friends considered him cured. But at the beginning of the cold weather he fell ill again, *in consequence of irregular living*; rapid suppuration was set up, which none of the remedies employed could check, and the patient died (166—168).

CASE CLXVII.

(5) Dr. Fedeli was called in to attend an American lady, aged thirty, by her husband, who told him she had been suffering for some time from bronchitis. On examination she was found to have *a cavity in both lungs*, with well-marked cavernous gurgling and pectoriloquy, fever, cough; copious, purulent, stinking expectoration; night sweats, diarrhœa, great shortness of breath, loss of appetite, and extreme weakness. Dr. Fedeli's prognosis was very unfavourable, but she was ordered to take the hypophosphite of lime, alternating, when the digestive functions would allow of it (218), with cod-liver oil. At the end of a month there was an improvement in all the symptoms, and in the condition of the lungs. But a new cavity formed in the lung, and the patient became so much reduced that her end appeared imminent. Under the influence of the treatment,

which, nevertheless, was steadily persevered in, the symptoms again gradually improved, until at the end of April she was able to leave Rome in a very satisfactory condition, with the injunction to continue the use of the hypophosphite of lime and occasionally of iron.

A year ago Dr. Fedeli heard that this patient had arrived at New York in good condition: she has since had a child, and continues in the enjoyment of good health.

Case CLXVIII.

(6) An English married lady of forty, of weak constitution, had suffered for several years, according to the diagnosis of several physicians, from miliary tubercles disseminated in both lungs. The use of the hypophosphite of soda in extremely minute doses for more than three months was followed by an improvement in the cough and the general symptoms, which has continued up to the present time, her state of health now being very satisfactory.

Case CLXIX.

(7) A lady of forty-five, of delicate, nervous temperament, who had been depressed by long mental suffering, was taken a few months before I saw her, says Dr. Fedeli, with slight dry cough, which was after a time followed by spittings of blood, loss of flesh and appetite; later still by muco-purulent expectoration, fever in the evening, and slight night sweats. I found on examination tubercles in both lungs, but more diffused in the right. She was ordered to take night and morning a dessert-spoonful of hypophosphite of soda, afterwards increased to a table-spoonful, and two spoonfuls of cod-liver oil (218). At the end of two months there was a marked improvement, and in seven weeks more she was completely cured. Although the unfavourable circumstances in which her lot was cast still continued, she remained for a long time after in good health. I have not heard of her lately.

Case CLXX.

(8) A Swiss courier of forty, who had had repeated attacks of hæmorrhage, and had been treated for phthisis by several

eminent physicians, came to consult me. I found advanced tubercles in both lungs, chiefly the right. He was ordered the hypophosphites, and at the end of nine weeks was so much improved in all respects that he was able to resume his duties. Two years later I again saw him in Rome in very satisfactory health, and again last winter, when I found on examination that he had quite recovered.

CASE CLXXI.

(9) Another courier, who had been much weakened by repeated hæmorrhoidal hæmorrhage, was found on examination to be suffering from consumption in the second stage. He was cured in three months by the use at first of the hypophosphite of soda, to which were afterwards added those of quinine and iron, or manganese. I have seen him since, nearly every year, and was happy to find he continues in good health.

CASE CLXXII.

(10) A woman of thirty took cold four months after confinement, and, the symptoms continuing to increase, was examined and found to be suffering from consumption with softening tubercles, occupying the top of both lungs. There were pain and dulness under both clavicles, diffused rhonchi, cough, expectoration tinged with blood, fever, loss of strength and appetite, etc. She was ordered to leave off nursing her child and to take a dessert-spoonful of syrup of hypophosphite of soda twice a day. This was gradually increased to three table-spoonfuls in the twenty-four hours. At the end of three weeks there was noted great improvement in all the symptoms, above all in strength and appetite. In two months she had almost completely regained her health. She was ordered to continue the remedy from time to time, and is now well.

CASE CLXXIII.

(11) The following case, says Dr. Fedeli, is of special interest:—A gentleman of fifty, already suffering from tubercles in an advanced stage, was taken with the symptoms of tubercular meningitis. The treatment used up to that time by several of my medical friends, by whom I was called in, had been

of no avail, and the patient's condition was considered highly perilous. I advised that, in addition to cod-liver oil, which he was already taking, he should be given the hypophosphite of lime, and no other drugs whatever. The syrup, which was given in very small doses, did not succeed at first in alleviating the symptoms. The vomiting and vertigo, which were brought on by the slightest motion, still continued, and the patient continued very weak for want of nutriment. The dose was therefore gradually raised to a tablespoonful night and morning. At the end of two weeks, I was much pleased to note that the vomiting had ceased, the vertigo had diminished, appetite had improved, and there was marked relief of all the symptoms, both of head and chest. This satisfaction was shared by my colleagues, and, in six weeks after beginning the treatment, he was able to leave his bed, which he had not done for seven months. At the end of four months he was able to resume his duties as secretary, and was advised not to leave off the treatment. I saw him occasionally after that for two years, not very strong, but satisfied with his condition. For a long time I remained without any news of him, but have since learnt that he has been circumvented by a quack doctor, and is now awaiting his end.

Case CLXXIV.

(12) A young woman of twenty-five came to me, complaining of great loss of strength and appetite, dry cough, difficulty of breathing, and pain in the chest. There was an anæmic souffle, diffused dry rhonchus, specially under the clavicle and axilla of left side, febrile pulse, abundant night sweats, &c.

She was ordered at first the hypophosphite of soda, and afterwards that of iron, with the required precautions, and the improvement produced was very manifest. She recovered her strength and appetite, the catamenia returned, and all the symptoms were relieved or disappeared.

547 A. Dr. Fedeli adds what follows:—'Before concluding my report I am happy to mention the very great utility of Dr. Churchill's hypophosphites in the treatment of lymphatic, ricketty, and scrofulous children (240). As an example I give the following:—

CASE CLXXV.

(13) A child of strongly marked lymphatic temperament, shortly after its first year, shewed progressively all the signs of hydrocephalus, which was treated first with the hypophosphite of lime, and afterwards with that of iron, in very minute doses. This was persevered in for a very long time, with occasional intermission, according to the indications of the case. The child is now nearly seven, and though still showing signs of a lymphatic tendency is very much improved, enjoys, upon the whole, good health; his intellect is quick and lively, his body well-formed and robust, the only thing left is that he is still liable to slight colds and headaches.

'I might add,' says Dr. Fedeli, 'other cases of struma, scrofula, cerebral or mesenteric tuberculosis in unhealthy, ricketty children or infants, as well as cases of amenorrhœa, anæmia, chloro-anæmia, &c., in which the use of the hypophosphites has been followed by *victorious* results; but the treatment must be kept up for a sufficient length of time, and directed with all possible care. Even in cases which ended unsuccessfully the remedy cannot be said to have been without effect (99). *All observers are now agreed that the remedies discovered by Dr. Churchill have a special physiogenic action upon the system* (114, 151), so that it is to be inferred that the unsuccessful results were due to one of the following causes:—the hypophosphites were not of the purity required; the rules laid down by the discoverer were not followed out; or, as was still more frequently the case, the treatment was only had recourse to when the conditions of curability (160) no longer existed. I must confirm what has been stated by Dr. Churchill as *to the absolute necessity of the hypophosphites being perfectly pure*, and prepared according to the method he communicated to Swann. The preparations made by other pharmaceutists are too frequently apt to do harm instead of good (87—93). Hence many of the failures which bring discredit upon the treatment. I know of too many such.

'I conclude by saying that I perfectly agree with the opinion of my friend, Dr. C. J. B. Williams, whose high scientific character and long experience in this class of diseases is so well known, and which he expressed to me by saying that:—"Having verified the therapeutical efficacy of the hypophosphites, he has come to the conclusion that, combined with the use of cod-liver oil (211, 444), they have an undoubted curative action in pulmonary phthisis. The combination of these two remedies is followed by more rapid improvement, and gives greater certainty of success"' (489).

APPENDIX IV.

CASES TREATED WITH THE INHALANTS.

548. As I have repeatedly stated, the hypophosphites are the *specific remedy of the tubercular diathesis*, of that general condition of the organism which I have called *phospholigy*, and which produces the morbid deposit called tubercle, but they are not the specific remedy of the local disease, caused by the tubercle itself when once it is formed, either in the lung, in the intestine, or elsewhere (160).

Hence, it follows that the prognosis, that is the issue of each case of consumption treated scientifically by the hypophosphites, depends upon the amount of lung tissue already destroyed by or involved in the tubercular deposit, and may offer every intermediate degree between an almost mathematical certainty of success (62, 63, 160), and a state of things where, at each downward step, the difficulties and complexities of the treatment increase, the curative result becomes more distant, more precarious, and more dependent upon accidental circumstances, until the only thing that can be predicated is that the patient *may* possibly recover, because there is still enough unimpaired lung tissue left to maintain life (165). Such being the case, the question naturally occurs, what are the conditions which favour, and what are those conditions which are adverse to a termination by one of the three modes pointed out as the inevitable issue of a tubercular deposit:—resorption of the tubercular matter (153); arrest of the local disease, with induration or cretification (154); or, lastly, its expulsion from the lung by elimination and accompanying ulceration and destruction of the surrounding tissue? (155).

It is a well-known fact, noted by all observers, that the tubercular matter, although almost always destined ultimately to undergo a process of softening and disintegration, which produces a similar action in the surrounding tissues, may, for an undetermined period of time, varying from a few days to several years, remain in an apparently quiescent state, and produce hardly any effect upon the lung. It has likewise been found that, although this condition of quiescence may be very long, it very seldom is so, and that the main cause which brings on its termination, and induces an active, instead of a passive, condition of the diseased part, is the hyperæmia or congestion of the surrounding tissue, induced either by excitement of the circulation, or by local irritation, congestion, or inflammation.

This congestive condition of the lung tissue is of so much importance that, as already seen, many pathologists look upon it as the essential character of the disease (349), and maintain that all tubercular deposit is a product of inflammation, while others assert that tubercle is a special or specific morbid product, and that the inflammation is only a secondary consequence or accidental sequel. As I have fully demonstrated in the course of this work, the latter is the true theory. The formation of tubercle is independent of the process of inflammation, just as inflammation is independent of the formation of tubercle; but the fact, nevertheless, remains that *next to subduing the cause which originates the tubercular material,* the main object the physician must keep in view is to diminish or control the conditions which excite or promote inflammation in the surrounding tissue, and thus endeavour to produce, by means of art that state of quiescence of which nature herself sometimes sets us an example (18, 20). Now the means we have of arresting or controlling inflammation are very imperfect and uncertain, even when we are able to apply them directly to the part diseased. They may be classed under two heads—diminution of the afflux of blood to the part, and—elimination of the superabundant blastema or nutrimentary material already collected, and converted or tending to be converted into the products of inflammation.

In all glandular organs this double effect may be produced by increasing the amount of natural *secretion.*

The lungs are glands which fulfil a two-fold object, the excretion of carbonic acid and the secretion of arterial blood. If, therefore, we were in possession of a means of *normally* stimulating the respiratory process we should be able to control, diminish, or altogether arrest any process of inflammation in the lung.

As already stated, I have discovered a series of compounds which possess this power, which increase the activity of the respiratory process, just as the presence of food in the mouth excites the flow of the saliva, or as that of aliments in the stomach excites the secretion of the gastric juice.

There can be no doubt of this fact in the mind of any one who has witnessed their action. All forms of dyspnœa depending upon a functional and not upon an organic cause are almost always immediately relieved, to the inexpressible comfort of the patient; the congestion and turgescence of the mucous membrane of the respiratory passages often disappear *ipso actu*, and patients who a few moments before were struggling for their last gasp of breath, are suddenly restored to complete and perfect breathing. I have seen many instances of this, when all other known means had failed, among others, in the case of a young foreign nobleman, allied to one of the most illustrious sovereign families in Europe, and who, in 1869, was thus relieved in half-an-hour of a most violent attack of asthma, which evidently threatened his life, which had already lasted two days, and had completely baffled the united skill of the most eminent physicians in Paris. I know, it may be objected, that a similar effect may be and is sometimes produced by the use of different well-known narcotics and sedatives, such as stramonium, &c.; but there is this wide difference between the stœchiological inhalants and narcotics:—the inhalants are *stœchiological* substances belonging to the first or second class of remedial agents, which simply increase normal action; the narcotics are toxic or poisonous substances which pervert or disturb some normal function (in this case that of innervation), and thus interfere with the morbid function (500). The proof of this is that narcotics are only of temporary efficacy, lose their power after a time, and lead to no permanent result; the inhalants not only act by producing momentary and, where possible, immediate relief, but, instead of being less active by use, rather become more so, and end, whenever such a result is *organically* possible, by producing a permanent cure.

The following are some of the main features of their action upon the system:—

When given to a person in health the only apparent and immediate effect which they produce is that of a desire to expand the lungs with air, a peculiar pleasure and ease in breathing, a feeling of exhilaration and strength, such as is felt by being in a mountain atm

There are several peculiarities in the *physiological* action of these substances:—

An increase of dose does not, after a certain limit, produce any corresponding increase of effect; the same quantity may usually be given to a young child as to an adult; no pathogenic symptoms whatever follow upon the use of large doses.

With regard to their *therapeutical* action, as I have already said, dyspnœa or difficulty of breathing, depending upon functional causes, has been, in almost every case without exception, immediately relieved; when depending upon organic change, the relief is more or less complete at first; in almost every case much greater than that produced by any other known means, and, in time, wherever possible, becomes permanent and complete.

Cough and expectoration are relieved, controlled, and permanently cured whenever there is not some *permanent organic condition equivalent to a loss or transformation of tissue.* In all initiatory states of congestion or inflammation of the air-passages, one or two applications are frequently sufficient to effect a complete removal of the incipient disease. It is a common thing for patients using the inhalants, even in an advanced state of organic lung disease, to remark that they alone, in a whole household, appear to be unaffected by variations of temperature, or by epidemic conditions, such as influenza, and experience no aggravation of cough, while all the other members may be suffering from every possible variety of transient or serious acute lung disease. *The stœchiological inhalants act undoubtedly as prophylactics of congestion or inflammation of the respiratory organs*, especially of such as are produced by the direct action of morbid causes upon the lungs themselves. *A dose taken daily is as sure a preservative against congestion* or irritation of the passages as a dose of quinine is of intermittent fever.

This *specific* action of the inhalants (228) produces all the effects which may be expected to follow an improvement in breathing power. *The circulation* becomes more full and regular, *hæmatosis* more active. *Appetite* and *digestion* equally improve, and *excretion* and *secretion* are increased. *Nutrition* participates in this general progress, and, unless an elimination or absorption of morbid product is going on, the patient at once gains in flesh and weight. All these effects point to a primordial stimulation of respiratory action and a greater activity in the function of lung tissue. As the hypophosphites are primordial and specific stimulants of organic innervation and of hæmatosis, so the stœchiological inhalants are primordial and specific stimulants of respiratory excretion and of arterialization.

That this action is *specific* is proved by the following facts (230):

It is equally manifest in all diseases of the air passages depending upon inflammation, or in which inflammation is one of the essential elements; consequently, with the exception of cancer, it applies to all the diseases of the respiratory apparatus.

Its influence is shown not upon one or several of the morbid conditions, but upon the whole set of morbid symptoms simultaneously.

Its suspension, before the disease is permanently cured, is followed by a return of all the symptoms, which again disappear when it is resumed, provided the suspension has not lasted too long, and the *organic condition* has not, in the meantime, become permanently aggravated.

As seventeen years ago I asserted that the hypophosphites were *a scientifically conditioned specific of tuberculosis*, so now do I deliberately aver that the stœchiological inhalants are a *scientifically conditioned specific* for bronchitis, asthma, hay fever, pneumonia, pleurisy, laryngitis, pharyngitis, diphtheria, sore-throat, coryza, whooping cough, and croup.

In every one of these complaints, except the last, I have now had a sufficient number of instances to say that in almost every case the result has more than exceeded any *possible* expectation, which might be allowable in the present state of pathology. What might appear barely possible has been effected with perfect ease and certainty, while many things which it would be scouted as delusion or imposture to pretend to, have nevertheless been effected. All the terms of surprise which involuntarily escaped from those who first used the hypophosphites after me (493) would have to be repeated over again by those who first used the inhalants, and so potent is this action, so unhoped for and apparently impossible are the results sometimes produced, that I can hardly, even in the most extreme cases, find it in my conscience to condemn a patient without at least an attempt to save him, and frequently the attempt succeeds, although even to me, with my present experience of lung disease, it may have appeared hopeless.

If this should appear exaggerated I can only say, that seventeen years ago, the same objection was made to my statements, as to the action of the hypophosphites, *which have since proved true in every particular;* that as then I was conscious that, if I erred, it could be neither through negligence or insincerity, so now, with larger and more matured experience, can I again bear the same testimony of myself. If the world at large, the heterogeneous conglomeration of good and bad, called the public, is right in showing itself indifferent and incredulous on such a matter, my statement will not be of much moment. If the public is only indifferent or incredulous because it is misled or hoodwinked, let it seek the truth and stand by it, or take the consequences. If my word is not sufficient assurance, I can, in the present instance, offer no other. As I have already said (509), I do not intend again to wait, seventeen years, for the slow accumulation of other testimony, and during that time have to wade through a fœtid mass of ignorance, malignity, and folly such as inventors alone must cross. If the reader has not personally a direct interest in the subject he may speculate on it at his pleasure: if he has, his belief or his disbelief of my statements may be a matter of great importance to himself, but can be but of very little to me.

I had intended to give a certain number of cases showing the action of these new remedies in the different diseases in which they have been used, but the bulk this book has already attained does not leave me room. I have only sufficient left to give a very condensed summary of the effects produced in a few of the principal complaints, and report a score of cases of phthisis treated by the inhalants.

Asthma.—Under the use of the inhalants, I have seen cases of more than twenty years' standing entirely and permanently cured, after having passed through almost every treatment in vain. I have had patients who had been suffering from daily attacks of asthma, for periods varying between two and twelve years, find themselves entirely free after three or four inhalations, remain in this state during the whole time of treatment, and never have another attack. I have seen patients, who had lived, for years, complete wrecks, restored not only to comfort, but to active, robust health.

In *bronchitis* I have had patients who had been gradually slipping down year after year, and had come to a point where, after trying every known resource, they were barely managing to keep hold upon life, restored sometimes to comfort and freedom from suffering, often to complete health and to active life.

In *acute bronchitis*, either simple or as a complication of chronic disease, I have obtained the same results, and in several instances have seen one single inhalation alter all the aspect of a case, and reverse every sign of imminent danger and of an impending catastrophe in less than twenty-four hours.

Cases of *laryngitis*, acute or chronic, simple or even tubercular, well-known to be the most hopeless of all diseases, have been cured completely and permanently, against all hope and all apparent possibility. Among other cases that of the celebrated author of the 'Parisians.'

The same result has been obtained in cases of *angina*, *pharyngitis* and *coryza* of seven, twelve, and twenty years' standing.

Hay-fever is usually permanently cured in a time which varies from a week to two or three months.

I have seen the most formidable attacks of *diphtheria*, when taken the first or second day, cured by only two applications.

Whooping cough of several months' standing has been cut short in a time varying from a week to a month. In the incipient stage the treatment is seldom required for more than a week.

I have seen cases of *chronic pneumonia* with hepatic and renal complications, cases of *pleurisy* of several years standing, completely and permanently cured.

On looking over the cases I have treated for the last six years I cannot say that I find a single one in which the treatment has failed. Whenever the amount of organically transformed tissue was not such as to preclude all hope of a successful result, it has always exceeded my own expectation, and I cannot find I have had a single case of failure which could not be attributed to one of two causes: either the treatment was left off too soon, or the patient by his own imprudence has aggravated his condition by inducing some acute complication which has proved fatal. But this last remark applies almost exclusively to cases of very advanced phthisis, coming under categories 9, 10, and 11 (165).

I am prepared for the mistrust with which these statements will be received, but since my experience concerning the hypophosphites (459), I feel the most complete indifference on that point. I can only again repeat that I am endeavouring rather to understate than to overstate the facts I have witnessed.

A few more remarks are required concerning the use of the inhalants in phthisis.

Next to the cessation of the diathesis, and the prevention of any further increase of the tubercular deposit, the most important thing is to remove any permanent or accidental cause which may induce or aggravate the congestion of the lung tissue; this is done by the inhalants, which show a specific action in preventing, decreasing, or removing the conditions which aggravate the local state of the lungs. By their means the *seven* first categories of phthisis (165) under which the different stages may be classed may be considered as always curable, the eighth and ninth very often, and the tenth sometimes. As far as the seventh, inclusively, I have had no case of failure which could not be positively attributed to the suspension of the treatment or to the fault of the patient. Not only, as I have said, do crude tubercles rapidly disappear under the action of the inhalants, but tubercular matter in a far advanced state of softening is re-absorbed, cavities are invested with a cicatricial membrane, and become dry and quiescent; extensive indurations and consolidations, whether owing to actual congestion or to partial arrest of the disease, become again pervious to air, and are often restored to complete functional activity.

In cases of acute softening, where the hypophosphites, unless very carefully administered, are apt to aggravate the complaint, the inhalants are specially useful. In all accidental inflammatory complications of the lung they produce a similar effect to that which they have in non-tubercular inflammation.

In the state of erethism of the nervous and vascular systems which constitutes the variety called florid phthisis, in patients constitutionally disposed to hæmorrhage, the employment of the inhalants at the outset of the treatment usually produces an improvement in the lung, which allows the use of the hypophosphites with much greater assurance and security than could be had by using the latter alone.

In fact, the great advantage of the inhalants, combined with the hypophosphites, in phthisis, is that they produce in a few months the same amount of improvement as could, many times, only have been obtained in several years (227) without them.

They control congestion, inflammation, and suppuration of the lung tissue so completely that the most aggravated symptoms are often reduced to a minimum in a few days, and the case then proceeds, from beginning to end, without one breakdown, or hardly a hitch in its progress. This gives the treatment of all curable cases a degree of regularity and certainty which it would be looked upon as preposterous to expect by any physician who had not been an eyewitness of the action of these remedies.

In cases where the hypophosphites have been too largely used, and the system, or the lung tissue, appears to have become intolerant of them, the inhalants are peculiarly indicated.

In all cases of arrested phthisis, either with induration (154), or excavation (155), the inhalants act not only as curative but as prophylactic agents against hyperæmia, inflammation, and increased or renewed secretion or suppuration.

From this it follows that, although consumption in every stage may be cured, and has been cured, by the hypophosphites alone, the combined use of the specific against the diathesis (the hypophosphites) and a specific against local hyperæmia (the inhalants) is the practical realisation of the principle I laid down, seventeen years ago, after a complete experimental study of the first, and which was that the progress of a case of consumption is entirely dependent upon the amount of lung tissue which remains unimpaired at the time of beginning the treatment.

The following cases will serve to illustrate these different points.

In most of them, the patients would, probably, not have got well with the hypophosphites alone; in none would the result have been so rapid, so complete, so steady, and so certain with the hypophosphites alone as it was with them and the inhalants combined.

As, however, I have already said, although the inhalants were originally invented for the use of the consumptive, they are still more efficacious in non-tubercular diseases of the air passages, while it is not unlikely that some of the series of entirely *new compounds*, of which they form a small part, may prove as effective in diseases of altogether a different class.

CASE CLXXVI.

(1) An English lady, the wife of a member of Parliament, consulted me in Paris in 1869. She was in the second stage of consumption, with both lungs affected, one throughout, the other to nearly two-thirds of its extent. There were all the usual symptoms in a very aggravated form—incessant cough, copious expectoration, great shortness of breath, profuse night sweats, great emaciation and still greater weakness, no appetite, fever at night; and, above all, there was a complication of diarrhœa and Bright's disease of the kidneys. I formed a very unfavourable opinion of the case, and had I been restricted to the hypophosphites alone, should have looked upon it as altogether hopeless. Fortunately, I had just before discovered the principle of the stœchiological inhalants, and had already used them successfully in several cases, so determined to give this patient the benefit of an attempt. For the first month or six weeks the progress made was slight, but after that

it became more marked, and at the end of about three months this lady was able to return to England much improved, though the cough was still troublesome, as a cavity had formed in one lung. During the winter of 1870 she again came to me in London, and again derived great benefit from the use of the inhalants, which she continued to use occasionally when there was any aggravation of the cough. I have not seen her now for more than a year, but have been told she continues in the enjoyment of very fair health. This was a case which, according to the received principles of prognosis, was utterly beyond all hope, not only on account of the general condition, but also of the complications and the extensive disorganization in the lungs.

Case CLXXVII.

(2) A Spanish gentleman, aged twenty-eight, the whole of whose family, consisting of father, mother, and two elder brothers, had died of consumption, came to put himself under my treatment in Paris in June 1870. There was great emaciation, much weakness, continual cough, great shortness of breath, abundant expectoration frequently mixed with blood, much fever at night, profuse night sweats, no appetite, and very great depression of spirits, owing to the previous fate of the remainder of his family. He had had three dangerous attacks of hæmorrhage. There were the usual auscultatory signs of extensive and rapid softening in both lungs, especially the left. The treatment was begun by the inhalants alone, as, owing to the tendency to hæmorrhage and the rapid disintegration of the tubercular deposit, I did not think the hypophosphites advisable (66). For the first two months there was but slight improvement, and during that time, the war between France and Germany having broken out, and the German armies being on the march to Paris, I decided upon removing to England, and the patient resolved to do the same, because, as he said, he saw no other chance of escaping the fate which had befallen all the rest of his family. The winter of 1870–71 was very severe, and during the greater part of it he, by my advice, kept the house, making slow but steady improvement. During that time there were several attacks of hæmorrhage, which were always immediately checked by the pyrogallic spray (75); but it was not until the month of

February that he was able to take the hypophosphite of soda. The idea of a native of Spain, in the condition of this patient, braving a London winter in hopes of getting cured of consumption appeared so utterly preposterous, particularly to the physicians whom he had left behind him at home, that it was set down as an hallucination, and as he was a man of note in his province the report was repeatedly spread during the winter that he had died. However, I had the satisfaction of sending him back in the month of April safe and sound, with no symptoms of the disease but a slight morning cough on getting up, and no signs in his lungs but a slight occasional dry crepitus at the apex of one of them. He was directed to continue the use of the hypophosphites, which now had become perfectly available. He spent the winter of 1871–72 at home in Spain, going out in all weathers, and wrote to me that he was perfectly well, and that the country people around him had given him the name of *El Resuscitado* (the risen from the dead). In May, 1872, he came to London to see me, and I had the gratification of finding, on auscultating him, that there were no signs of disease in either lung, except slight harshness in the respiratory murmur at the left apex. His general health was perfect in every respect.

Case CLXXVIII.

(3) A young English lady, aged sixteen, was placed under my care in Paris at the beginning of the winter of 1869. There was at that time a large cavity in the right lung, and extensive tubercular deposit in an advanced state of softening in the left. The general symptoms of cough, expectoration, night sweats, fever, and diarrhœa were very strongly marked. She had had several attacks of hæmoptysis, and her weakness was so great that she could hardly walk. I told her mother I had little hope of saving her, but consented to try. She was placed under treatment of the inhalants, and in about a month had improved so much that I thought the hypophosphites might be added (201). They were borne well, and in about three months the left lung was nearly well and the right much improved. She remained under treatment the whole of the winter, and in the spring was able to return to England, where I saw her in the autumn of 1870. She then looked the picture of health, had

no remains of any symptoms but a little cough in the morning on getting up, and somewhat copious expectoration. On auscultation, I found the left lung was entirely healed, but that there was still a very extensive cavity in the right, with considerable gurgling. She again took the inhalants with great benefit, the expectoration being much lessened thereby. In the summer she returned to the country, and was told to take the syrup of hypophosphite of soda from time to time. She continued in the same favourable condition for some time, when, having unfortunately been persuaded by a local practitioner to add cod-liver oil to the hypophosphite, she was attacked with violent hæmorrhage. Her mother immediately brought her up to London, and requested me to see her. I found her in a most critical condition, and for two days she was in the greatest danger, the hæmorrhage, both in quantity and violence, being the most formidable I have ever seen. At last, however, it yielded to the pyrogallic spray, and in about a month she was as well as before. I found that she had grown very tall, and had improved in every respect, but there was considerable sinking of the right side of the thorax, and still the signs of a large cavity. I again saw her a year later, and she used the inhalants occasionally during the winter. No one, by her appearance, could have supposed there was anything the matter with her, and by persons who saw her in my waiting-room with a sister the latter was always supposed to be the patient. I have not seen her now for some time: when I last heard of her she was still in good health.

Case CLXXIX.

(4) At the beginning of 1868 I was consulted in Paris by a French lady for her daughter, aged sixteen, who had just left the *Conservatoire* (the French Government Dramatic School) with great honours, and had immediately received an engagement for her *début* at Brussels. The poor girl had been broken down by anxiety and overwork during her competitive examinations, and was suffering from galloping consumption. There was intense pallor, extreme weakness and emaciation, short, dry, incessant, harassing cough, with little or no expectoration; frequent vomitings, skin hot, with pulse at 120; profuse night sweats, little rest at night, great loathing for food, and occasional

diarrhœa; menstruation suppressed. She had been ailing for about two months; had been taking cod-liver oil, sedatives and narcotics to combat the cough and fever; but had derived no benefit from the treatment, and had rapidly come to the condition I found her in. On auscultation, I found great difficulty of breathing, and numerous sibilant rhonchi throughout both lungs, with a few moist ones at the right apex. To add to the pathos of the case, she was engaged to be married, and the marriage was to have taken place in three months, at the same time as her *début* at Brussels. My prognosis, as in all acute cases (66), was very guarded. I could only promise to do my best, and the *impresario* at Brussels kindly consented to defer her engagement for six months. Under the use of the inhalants and the hypophosphites there was a marked change in the course of the first week, and at the end of a month I was able to pronounce her out of danger. Nearly all the symptoms had disappeared, except a little morning cough, and still a few moist râles at right apex. She had regained her good looks, and was to all outward appearance in perfect health. After another month the inhalations were discontinued; I advised her to remove into the country and continue the hypophosphites alone, but also to defer both the *début* and her marriage until the following year: this was done for the last but not the first, which could not be put off. Before the appointed time came, however, her recovery was so complete that I thought there was no longer any objection. She made her first appearance with marked success, and the next year was married. This lady is the original of the heroine of the 'Parisians,' the celebrated author of which was at that time under my care. She is now one of the stars of the first theatre in Paris, the *Théâtre Français.*

Case CLXXX.

(5) A young officer in the Marines, aged nineteen, was taken ill of consumption of a rapid form in 1872. He was sent to the hospital, and, having heard of my treatment, asked for leave to come to London and consult me. He was considered in so precarious a state that the medical officer in charge stated that he would never return alive. I found on examination extensive deposit in both lungs in a state of rapid softening. All the

general symptoms were very intense, and altogether, according to the usual prognosis, the case must have rapidly proved fatal. Under the use of the inhalants all the symptoms rapidly abated, and at the end of six months he was able to return to Ireland perfectly well, without any signs or symptoms of the disease. He was directed to continue the use of the hypophosphites in prophylactic doses (198). I heard from him last year, when he wrote to say he was in robust health, and that 'after a day's hunting he felt as fresh as a two-year colt.'

Case CLXXXI.

(6) A young gentleman who was preparing for the ministry came to me in 1873. He was suffering from the usual symptoms of advanced phthisis; he had had several attacks of hæmorrhage, and I found on examination softened tubercles in the right and a cavity in the left lung. After about a month's treatment by the inhalants there was a marked improvement of all the symptoms. The hypophosphites were then added, and in three months the right lung had quite recovered, and the cavity had become dry and much contracted in the left. The treatment by the inhalants was then suspended, and he returned home with directions to continue with the hypophosphites alone. I saw him again in the beginning of the winter, which I had advised him to spend in the south of France. He spent a part of last winter in Paris, and the remainder South. When I heard from him last he continued in the enjoyment of very good health.

Case CLXXXII.

(7) An English officer in the army, who had been sent to Madeira during the winter of 1871-72, came home very much worse, and consulted me in the beginning of 1872. He was then in a very critical state; considerable softening in the right lung and a cavity in the left, very intense general symptoms, diarrhœa, and a marked tendency to hæmoptysis. He improved very rapidly with the inhalants, and in about five months was able to return to his home in the country. His right lung had healed; the left had greatly improved. He spent the winter of 1872 in England very comfortably, riding out when the weather was fine, and taking proper care of him-

self, with occasional use of the hypophosphites. During the two last summers he has been driving a four-in-hand, and reckons that, since he was under my treatment, he has gone over 20,000 miles. I see him occasionally; he still has a certain amount of cough and expectoration, and there are still the signs of a cavity; but in all other respects he is in very good health. He spent the last winter in Jamaica, but was rather the worse for it, and on his return took a few inhalations at the beginning of the summer, which set him right once more. He prefers spending the present severe winter (1874—75) at home in England, and so far has done very well, without any suffering whatever from change of weather.

CASE CLXXXIII.

(8) An Irish lady, who had lost a sister of consumption and whose brother had been under my treatment for asthma consequent upon arrested phthisis, consulted me in 1873. There were a few slight moist râles disseminated throughout both lungs, with great shortness of breath, very great weakness, troublesome cough and slight expectoration, considerable loss of flesh, and no appetite. Under the use of the inhalants, at first alone and afterwards combined with the hypophosphites, the improvement was at first slow, but gradual and steady, and in three months the patient was able to return home, where, with the occasional use of the hypophosphites, she has lived in the enjoyment of sound and, for her, robust health. She is able to take exercise on foot at all seasons, which had been impossible for several years, and her condition continues most satisfactory.

CASE CLXXXIV.

(9) An Irish gentleman, aged nineteen, suffering from the general and local signs of phthisis at the beginning of the second stage, consulted me in 1871, but would not follow my advice, which was to put himself under treatment by the inhalants. As he had a relative in India, he preferred following the advice of his family physician, and made a voyage out there. Unfortunately this, instead of answering his expectations, aggravated his condition very much, so that he decided on returning home

and putting himself under my care. In June, 1872, I found that the deposit, which was limited when I first examined him, had increased very much, and all the general symptoms—cough, expectoration, fever, night sweats, loss of flesh—had got very much worse. He had also had spitting of blood, and the weakness had become very great. There were numerous very humid râles occupying the upper part of the right lung and about two-thirds of the left. Under the action of the inhalants and the hypophosphites improvement was very marked and rapid, and in about four months after the beginning of the treatment he was able to return home. He continued the use of the hypophosphites, in prophylactic doses, and by my advice spent the following winter in the South of Europe. I saw him on his way out and home, examined him each time, and lately had an opportunity of doing so again. There was no sign of disease in either of the lungs.

Case CLXXXV.

(10) A young Spanish lady was brought over to London by her friends in the autumn of 1873, and placed under my treatment. She then presented very intense symptoms of phthisis: incessant cough, with moderate frothy and muco-purulent expectoration, at times mixed with blood; great and rapid loss of flesh, fever at night and profuse night sweats, great loathing for food, frequent vomitings, menstruation very scanty and irregular. There were signs of rapid and extensive softening in both lungs, particularly the right. Although the season was very unfavourable, and the sudden change of climate and habits very much against the patient, she after the first fortnight made steady and regular improvement. At first the hypophosphites were not tolerated, and always seemed to aggravate the cough and increase the spitting of blood; the inhalants were therefore used alone, but in about three weeks, the special lung symptoms having abated, she was able to take them with advantage. She remained in London until February of the following year, when, as all the general symptoms had disappeared, and of the local signs only a few dry crepitant rhonchi at the apex of the right lung still remained, she was allowed to return home, with injunctions to continue the use of the hypophosphites. I heard from her after her return, and during the remainder of the winter and summer

the reports were very satisfactory; but at the beginning of the next autumn she caught cold, owing to exposure, and the cough had again returned. She intended to come back to London, but as her home is near the seat of the civil war in Spain, that circumstance may have prevented her doing so, and I have not heard of her since.

Case CLXXXVI.

(11) A young Scotch gentleman had been advised to consult me three years ago, but had preferred following the counsels of his family physician, had used the ordinary treatment by cod-liver oil and tonics, and had spent his winters abroad, the last in Algiers. During the whole of that time he had steadily lost ground; his strength and weight had declined from year to year, the shortness of breath, cough, and expectoration had increased, and he had had several attacks of spitting of blood.

On his return from Algiers, in the spring of 1874, he came and consulted me. I found on examination considerable tubercular deposit in the right lung, and also, but less, in the left. The general symptoms were as already stated, and the patient showed the signs of marked hæmorrhagic temperament. For this reason and on account of the more rapid softening which seemed to have been set up during the latter part of his stay in Algiers, the inhalants were at first used alone. During the first month there were one or two returns of hæmorrhage, which were, however, immediately repressed by the pyrogallic spray; and about the end of that time improvement set in and was steadily kept up, until in three months time he was able to return home to Scotland. His medical adviser was requested to examine his lungs, and expressed great astonishment on finding they were perfectly sound. He was then told the patient had been under my treatment, and expressed still greater surprise, mingled with feelings of another kind. By my advice the patient is spending his winter south, and continuing the use of the hypophosphites in prophylactic doses. I heard from him a short time since and he continued in perfect health.

Case CLXXXVII.

(12) A young English nobleman consulted me in the summer of 1872. I found him suffering from consumption in the second

stage, and advised him to place himself under my treatment by the inhalants and the hypophosphites. He said he would consider the matter, but did not return until two years after, in 1874. In the meanwhile he had followed the directions of one of the leading London physicians, had used the ordinary treatment, and had spent two winters in the South of Europe. During all this time the disease had steadily progressed, and, besides, had extended to the windpipe, and he had entirely lost his voice. For this he had consulted an eminent specialist in Paris, and had been under his treatment for a considerable time, but without receiving any relief therefrom. During the preceding winter, having met with one of my patients, he had, by his advice, taken the hypophosphites, which had somewhat arrested the complaint, without, however, relieving the laryngeal symptoms, the voice still remaining quite lost. On examination I found moist crepitus at the apex of the left lung, considerable cough and expectoration, moderate emaciation, a feeling of irritation and pain in the throat. The left vocal chord was much swelled and motionless during attempts at vocal emission. He was placed under treatment by the inhalants at first alone, and at the end of about a month-and-a-half began to show well-marked signs of improvement. This treatment was continued, and the improvement kept up during the summer: the voice gradually returned, the cough and expectoration decreased, the vocal chord returned to its natural size and recovered its mobility; the crepitus in the lung disappeared, while the looks and general health were very much improved. After the month of June the greater part of the summer was spent by the patient either yachting or in the country, with occasional visits to town for a week's treatment. In October every sign and symptom of disease had disappeared, except a little cough and a small pellet of expectoration in the morning on getting up.

CASE CLXXXVIII.

(13) A Brazilian gentleman came under my care in 1873, with the usual characteristic signs of tubercular disease in the second stage. He had been sent to Europe for advice and change of air, but had derived no benefit from either. Hearing of my treatment in Lisbon, he had come over to London to place him-

self under my care. There was considerable softening tubercular matter in both lungs, but what was chiefly remarkable was the very great depression and despair of the patient, so unlike the confidence and buoyancy usually met with in consumptives. His nights particularly were very bad, owing to the cough and night sweats, and he had had several attacks of hæmoptysis. Within the first week the inhalants produced a marked change for the better; in about a fortnight he was made to begin the use of the hypophosphites; nutrition greatly improved, and at the end of four months no signs or symptoms of the disease were left. He then returned to Lisbon, with directions to continue the use of the hypophosphites. He stayed there about two months, during which he continued in perfect health, and after that time returned home to Brazil.

CASE CLXXXIX.

(14) A young English lady, aged twenty-one, came under my care in 1871. Several years before she had been attacked with consumption, and had gone to Naples during the winter. There she had taken the hypophosphites by the prescription of a leading Italian physician, had apparently got well, and had come back to England. Two years after she again began to cough and lose flesh (169), but this time got no hypophosphite, and the disease continued to progress unchecked. Shortly before I saw her she had been seen by three of the leading London physicians, who had been unanimous in their opinion that she could not live more than one or two months, and would certainly not get through the winter. I found her in a state of extreme weakness, hardly able to walk across the room; torn with incessant cough night and day, suffering from extreme difficulty of breathing, fever and profuse night sweats, great pain in the side, no appetite, and menstruation suppressed. On examination, I found the whole of the left lung apparently consolidated, with great dulness on percussion, and hardly any respiratory murmur throughout, and very little motion of that side of the chest. On the right side there was great increase of respiratory sounds, and well-marked moist crepitus in the right supraspinous fossa. It was evident there was a congested and indurated lung on the left side consequent upon arrested phthisis, with a fresh deposit in the second stage beginning to invade

the right. Another serious feature in this case was the very manifest tendency to hæmoptysis, of which there had already been several attacks. In such a case, and in the impossibility of determining how far the induration of the left lung was removable, I could give no positive assurance of recovery, and could only promise to do my best. For more than six weeks the improvement was very slow. Several attempts to administer very minute doses of hypophosphites invariably brought on bloody expectoration, and increased the fever and difficulty of breathing; still there was somewhat more strength, easier breathing and cough, and night sweats had decreased. In about two months the improvement was somewhat more manifest, and, in spite of the bad weather, continued slowly and steadily throughout the winter. At the end of that time the cough had become very moderate, expectoration much less and very easy, strength greatly improved, appetite good, fever and night sweats ceased, considerable gain of flesh, breathing sound now audible throughout the whole of left side, mingled with a few dry and sibilant rhonchi; no crepitus heard at the right apex, expansion of left side of chest nearly as complete as the other. Several attempts to administer the hypophosphites always produced difficulty of breathing and pain and signs of congestion in the left lung, so that the treatment was confined exclusively to the use of the inhalants. During the following summer the patient removed into the country, and I saw her from time to time, whenever any cold increased the congestion of the left lung. The following winter was spent in London, with the occasional use of the inhalants. The general and local condition both continued to improve, and in the summer following, eighteen months after beginning the treatment, there were no general symptoms left; cough had quite ceased, breathing was very fair, general strength good, appearance that of blooming health, and no auscultatory signs left, except somewhat diminished breathing in the left lung. Since then this young lady has spent her summers in England and her winters in the South of France, and continues in the same satisfactory condition.

Case CXC.

(15) A young lady from the South of France came over to London to place herself under my care last summer. Two years

before she had been attacked with consumption, for which she was ordered to take my hypophosphite of soda. This had been followed by marked improvement, but unfortunately the benefit produced was so marked that the dose was continually increased until the patient began to complain of increased difficulty of breathing, more frequent and troublesome cough, and occasional appearances of blood in the expectoration (200, 202). The hypophosphites were then thought by the physicians, in attendance upon her, to be injurious, and were ordered to be discontinued, while instead she was to take the phosphate of lime. For a time this seemed to answer, the symptoms of congestion and irritation were relieved, and the improvement was attributed not to the cessation of the excessive doses of *hypophosphites*, but to the beneficial effect of the *phosphate*. This, however, only lasted until the effect of the hypophosphites had worn off. Very soon the night sweats and signs of general debility again set in, and after losing ground for several months the patient was brought to London by her father, and put under my care.

I found there were great weakness and extreme shortness of breath, great pain between the shoulders and occasionally in the right side, considerable emaciation, hectic fever and night sweats, very poor appetite, and scanty menstruation. The left lung was sound, but the right considerably consolidated, with decreased respiratory murmur throughout, increased vocal resonance, and moist rhonchi at the apex. Almost immediately after her arrival in London, probably owing to the fatigue and the intense heat she had had to bear on the journey, she had two violent attacks of hæmoptysis, which gave me some trouble, but were finally mastered by the pyrogallic spray. Improvement was slow during the first month, owing to the great tendency to hæmoptysis, as shown by the appearance of streaks of blood in the sputa. At the end of that time, however, these had entirely ceased, all the general symptoms had been first relieved, and then altogether removed; the dulness and imperfect respiration of the right lung had given place to the natural resonance and normal respiratory murmur; the pains in the chest and back had disappeared, the patient had assumed a look of blooming health, and at the beginning of October she was pronounced well, and able to return home. Since then she has been taking one teaspoonful of my syrup of hypophosphite of soda every three days, and continues in the enjoyment of very good health.

Case CXCI.

(16) A young gentleman, an architect, consulted me in 1871. He had been ill only about three months; he complained of troublesome cough, very abundant muco-purulent expectoration, considerable fever at night, with profuse sweats in the morning. There were great emaciation and extreme weakness, no appetite, vomiting in the morning on getting up, and occasional diarrhœa.

I found on examination softened tubercles disseminated throughout both lungs, and in greater quantity at the left apex.

He was placed under treatment with the inhalants alone, and immediately began to improve. At the end of the first week the vomiting, fever, and night sweats had entirely ceased; appetite and strength had much improved; cough and expectoration had greatly diminished; and the patient said he felt altogether another man. In three weeks more the hypophosphites were added to the treatment, and he was able to return to his business. At the end of three months' treatment the only symptoms left were a little morning cough and expectoration; he had almost entirely regained his strength, and had undertaken to go down into the country on professional business. I found on auscultation that the only signs of disease were a few dry and sibilant rhonchi at the top of the left lung. He was directed to continue the use of the hypophosphites. On his return to London some months later he called to see me. There was no sign of disease in either lung, and he said that he felt stronger and better than he had ever done in his life. Since then he has married, and I heard some time ago, from a friend of his, that he was in complete and robust health.

Case CXCII.

(17) A French married lady came from Paris and placed herself under my treatment last summer. She had remained in Paris with her husband during the siege, and had never recovered the anxiety and privations she had undergone. She was ex-

tremely pale, weak, and emaciated, with very great shortness of breath, quite unable to go up even one flight of stairs; suffered from a short, dry and worrying cough, giving her but little rest at night; little expectoration, fever and night sweats, no appetite, very scanty catamenia. On auscultation I found marked dulness and a few moist râles at apex of right lung, and numerous dry rhonchi throughout both. In this case it was very likely the hypophosphites alone, unless given cautiously and in small doses, might have aggravated the cough and hastened the process of softening. She was given the inhalants alone, with a very marked result, in the course of the first fortnight: cough was much relieved, difficulty of breathing had nearly disappeared, no fever or night sweats, and strength somewhat recovered. For the next fortnight she remained stationary, and was then ordered the syrup of hypophosphite of soda, one teaspoonful daily. This was followed by marked improvement, and in two months and a half more she had entirely recovered, with the exception of a little cough after mounting the stairs or after laughing. The lungs on examination gave no signs of disease, and her husband, who had been away in France for some time, was now, on his return, quite astonished at her improvement. She continued to use the inhalants about once or twice a week for another month, and in August had to come for about ten days to get rid of a cold, which had brought on considerable return of cough. Since then, she has continued in perfect health, and has spent the present severe winter (1874—75) in London without any relapse, only taking prophylactic doses of the hypophosphite.

Case CXCIII.

(18) A young Irish gentleman, an officer in the army, had been obliged to sell out, owing to an attack of rapid phthisis. When he came under my care he was in a very advanced condition, and as I had not the same amount of experience in the use of the inhalants as at present I hardly dared to hope for a favourable issue. I found on examination that both lungs, particularly the left, were extensively diseased, softening was going on very rapidly, and all the general symptoms—cough, expectoration, fever, night sweats, emaciation, extreme loss of flesh and strength—were at nearly the highest degree of intensity. All

the usual modes of treatment had been tried under the direction of the most eminent physicians in Dublin, without giving any relief. The worst feature in the case, indicating the rapidity with which the lung tissue was breaking down, was the frequent attacks of hæmorrhage, which had already placed the patient's life several times in danger. The inhalants were at first used alone; improvement was slow for the first fortnight, then became more marked; but was interrupted by a violent attack of hæmoptysis, which was arrested by the pyrogallic spray, without the patient's being compelled to keep his bed for a single day. After that improvement was again somewhat slow for another fortnight, but then became very steady and regular. All the symptoms yielded one by one, and in a few months the patient was to all external appearance restored to sound health, with the exception of a little morning cough and some expectoration on getting up or after exertion. There still remained, however, a certain amount of dulness, and a few mixed rhonchi at the apex of the left lung. He now regretted very much having left the army, and got re-appointed in the militia. He left London for the country to attend to his new duties, and at first reported that he was able to discharge them as well as ever. But one field-day, after considerable fatigue and exposure to rain, he was seized with a formidable attack of hæmorrhage. He immediately took the rail for London, and sent for me. Unfortunately I was not at home, and did not reach him for some hours, when I found the amount of blood lost, only since his arrival, in London must have exceeded four pounds. The pyrogallic spray again proved efficacious, and the people of the hotel, who never expected to see him again alive, were much surprised at seeing him able to leave his room a few days after. He was again placed under the treatment with the inhalants for a few weeks, and at the end of that time was as well as before his last accident. The auscultatory signs in the left lung had also diminished. There was less dulness and fewer râles, though still some remaining. He was directed to use small doses of hypophosphites, and occasionally pills of pyrogallic acid. I heard of him a few months ago; he was then in good health, and on the eve of being married.

CASE CXCIV.

(19) An English gentleman, aged forty, had been suffering for about a year from cough, considerable expectoration, great shortness of breath, night sweats, loss of appetite, flesh and strength. Of late he had been too weak to attend to business, and came to consult me in the summer of 1874. On examination, I found a considerable amount of tubercular matter in a state of softening, occupying the upper third of right lung. He was placed under treatment by the inhalants, and in about a month all the general symptoms had disappeared, except slight cough and expectoration in the morning. The stethoscopic signs had also considerably improved. The hypophosphites were then added, and at the end of another six weeks the cough and expectoration had entirely ceased, and all the local signs had disappeared. He then left for home, with directions to continue the hypophosphites in prophylactic doses. Four months after, while on a business visit to London, he called to see me, and I found him in the enjoyment of what he said was better health than he had known for several years. There was no symptom or auscultatory sign of disease; he was attending closely to business, and for the last two months had gained one pound in weight every week.

CASE CXCV.

(20) An English gentleman who had been suffering from phthisis for four years, and had spent two winters in the South of Europe without any benefit, placed himself under my care at the end of the summer of 1873. He was then much emaciated, very weak, unable to attend to business, complained of great want of breath, very troublesome cough, profuse expectoration, night sweats, and no appetite. I found there were softened tubercles very far advanced occupying the whole of the left lung and the upper third of the right. He was kept under treatment by the inhalants alone, for about a month, with considerable improvement of all the symptoms; then the hypophosphites were added, and in two months more all the general symptoms had disappeared, except a certain amount of cough and about half the previous quantity of expectoration. The right lung was nearly well, but the softening

was still considerable in the left. In March he left for the South of Europe, in order to accompany his wife, who was ordered abroad for her own health. He was abroad about two months, during which time he continued the use of the hypophosphites. On his return, I found the right lung was quite well; but there were cavernulous râles in the left. The general health was very good; he was attending to his business, and, except cough and occasionally expectoration of a few large sputa, there was no other symptom. During the present severe winter (1874—75) he has had a slight attack of bronchitis, with moist crepitus at base of right lung, which the inhalants caused to disappear in about ten days. He takes the inhalants and hypophosphite alternately, has never kept the house a single day, attends closely to his business, and goes out in all weathers.

Cases such as the preceding twenty might be reported in almost any number, but they would be merely a repetition of the same conditions and almost invariably the same results.

549. As already said I had intended to report a certain number of cases in illustration of the action of the inhalants in asthma, bronchitis (both acute and chronic), pneumonia, pleurisy, laryngitis, angina, diphtheria, whooping-cough, and throat-deafness, but this volume has already swelled to such a length that I am compelled to postpone their publication, which will perhaps be made at some future time in a separate and more complete form, when I shall attempt to show the bearings of stœchiological pathology upon these different forms of disease.

550. At the last moment an important fact has been discovered in connexion with the alleged failure of ***my*** hypophosphites, as reported by Dr. Todini (539), viz., that there exists at Naples a piratical manufacture of ***my*** hypophosphites, to which *forgeries* of my signature are affixed.

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